National Assessment Prototype

June 2000

National Assessment Prototype
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Introduction

In the 1997-2001 Strategic Plan, the BLM committed to *"develop and implement a comprehensive strategy for systematic resource assessment on the public lands."* This National Assessment Prototype is a step toward developing such a systematic assessment for land health and resource use on the public lands. The Prototype tests the use of a small, carefully-selected set of indicators to portray patterns of resource condition and risk to public lands at the west-wide level. The Prototype Team used the set of indicators recommended by the Resource Assessment Strategy Team to develop maps and initial analyses from readily available data from both internal and external sources. While this effort was not designed to be comprehensive in scope or analyses, it provides a powerful look at the level of information available about the health of the lands and our management of them.

An important aim of a comprehensive strategy is to ensure that assessments of different geographic extent and purpose are sufficiently "linked," that is, organized and carried out so as to eliminate wasteful duplication of effort and the collection of extraneous data and information. Starting with a national assessment provides a framework for collecting and reporting critical local and regional data so it can be aggregated to meaningful indicators nationally. This prototype is designed to provide an overall "snapshot" of the public lands and what we know about them. As you will see from reviewing the maps, it highlights areas and issues that need more detailed characterization through regional and perhaps local assessments.

Description of products

Twenty maps cover measurements or indicators of key biophysical and socioeconomic criteria.

Cover: BLM management responsibilities (land status)

1. BLM lands within subbasins
2. BLM surface parcel size
3. Vegetation assemblages
4. Cultural resources
5. Air quality
6. Water quality
7. Riparian condition – "acceptable"
8. Riparian condition – "unacceptable"
9. Special status species
10. Fire frequency and land condition
11. Weed distribution
12. Special recreation permits
13. Oil and gas application for permit to drill approvals
14. Land use conversion
15. Economic dependency
16. Grazing revenue
17. Leasable mineral revenues
18. Per capita income
19. Population density
20. Population density change

A one page narrative accompanies each of these maps to describe some basic information about the map: what is portrayed and the source and quality of the data. Along with this information, the result of initial analysis is presented - some correlations that are apparent from simple overlays, relevance of this information to BLM lands and decisions, information about the resources obtained from program specialists that render the map more meaningful, and management concerns that the information suggests.

In addition, 5 mylar overlays are provided in a separate pocket to increase the utility of these twenty maps:

Land status
Special status species
Land use conversion
Population density
Congressional districts

Additional maps were prepared in the process of selecting these basic twenty maps. They will be available for distribution in July 2000. The additional maps include:

Special areas
Fossil resource potential
Air quality: visibility
Water quality: category 1 watersheds
Riparian amount
Riparian condition (not rated)
Soil stability
Imperiled species on BLM lands
Insect and disease risk to forested ecosystems
Recreation use (hunting, fishing and wildlife watching)
Grazing permits and leases
Change in per capita income
Proximity of BLM lands to population centers and growth areas
Natural amenities index

We hope to be able to provide the following maps in July as well:

Land features (terrain, rivers, transportation, major cities)
Planning areas
Road density index
Mining

Uses

This prototype was designed for four basic purposes:

1. Provide information for sound decision-making
2. Create a visual representation to more easily inform the public about BLM, particularly the agency's budget needs
3. Provide a base upon which to develop a systematic assessment strategy for the BLM
4. Generate a baseline to determine change in the condition of the public lands

In the course of developing this prototype, many more specific uses were identified for this national level information. Budget, communications, policy-making, and support for regional or local decisions were areas most frequently mentioned.

For budget purposes, it can be used to:
✓ explain budget requests and strategic planning
✓ illustrate compelling priorities for funding allocation
✓ set planning target allocations
✓ improve understanding of situational variations throughout the public land states

As a communications tool, it:

- ✓ provides readily understandable information for reaching the public and elected officials
- ✓ can be used for orientation for new employees or transitioning managers
- ✓ provides resource information to field offices and local communities for addressing issues across jurisdictional boundaries

It can be used in national policy-making to:

- ✓ identify patterns, ecosystem-wide characteristics, and major socioeconomic trends of use and enjoyment of the public lands
- ✓ help set priorities
- ✓ inform legislative efforts
- ✓ provide spatial approach to oversight and accountability

For regional or local decisions, this information is helpful for:

- ✓ providing context for regional-level assessments
- ✓ compiling basic data to be considered in more rigorous or local analyses
- ✓ providing context for land use decisions
- ✓ identifying priorities for planning and NEPA activities
- ✓ supporting planning/NEPA documents (though not part of the plans)
- ✓ developing natural resource conservation strategies
- ✓ Identifying needs for special management areas
- ✓ setting local or regional allocations

Considerations

A few thoughts you should keep in mind while using these materials –

Many agencies and organizations have other efforts underway to categorize land health. We believe this prototype is a start toward defining the way BLM considers and reports on the health of the land and our management of the public resources.

There are many other options for presenting the available information. There is a considerable wealth of additional data that could be translated into similar products if the resources are directed towards doing such in a systematic approach. Much of the data we would like to present is simply unavailable without considerable expenditures of resources.

These are not perfect indicators. They do represent the best available data with west-wide consistency for these criteria. Use and feedback should refine and improve on these indicators.

There are too many possible combinations for any analysis to be exhaustive. Even with perfect data and rigorous analysis, we still have to make hard decisions.

No one map tells the whole story. But each does tell us something that needs to be considered.

Correlations do not equal causation. They do lead us to find out why these occurrences correlate, or what options this provides us in our management of the lands and resources.

In many instances, the data were smoothed to present detailed information at a national scale. Small features do not show up at this scale. While this allows a valid representation at a national scale, finer detail should be used for site specific or local needs.

This prototype doesn't replace field surveys. It may start to provide a framework for collecting and reporting field surveys so the data can be aggregated to the national level spatially.

This is a snapshot in time. Where possible, relevant trend indicators are included. This was not possible nor meaningful for all indicators.

The focus for this effort was public lands and resources. As a result, most of the maps concentrate on what is occurring on BLM-managed interests. Some of the maps are not limited to BLM, as they are more relevant to BLM decision-making when what occurs on BLM lands are considered in the context of what is happening around them.

BLM Management Responsibilities

Indicator: BLM management responsibilities in the western states. This map displays BLM surface management responsibilities, along with some special designations: Wild and Scenic Rivers, National Monuments (as of March, 2000,) National Conservation Areas, and Wilderness Areas over 100,000 acres. Not included are Wilderness Study Areas and Trails. This map also shows BLM's minerals management responsibilities for the federal mineral estate underlying BLM surface and other federal agency surface, and for Indian Reservations.

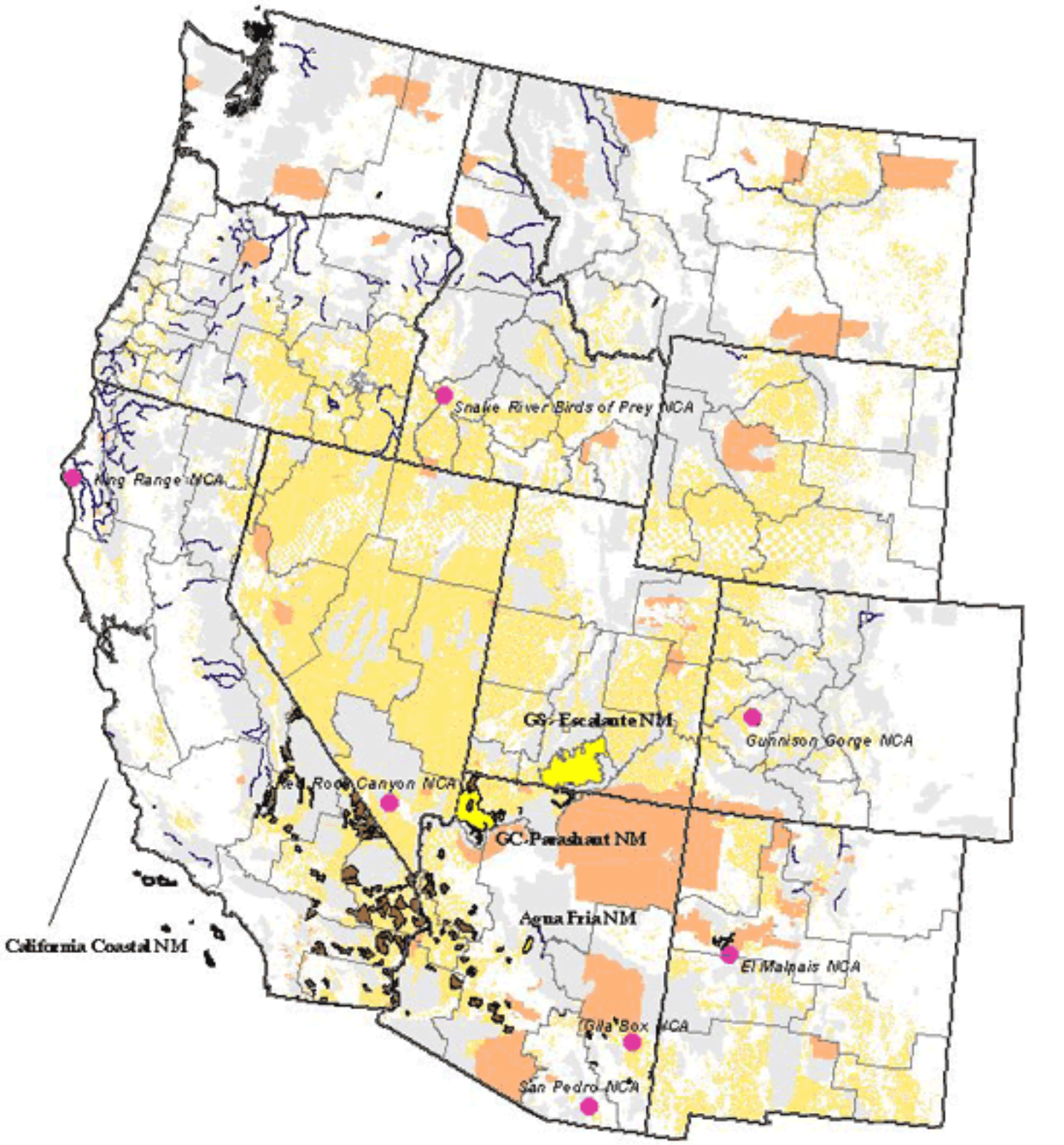
Key Findings: This base map provides a clearer perspective of the relationships between BLM management responsibilities and specific indicator maps. Note the significant portion of "checkerboard" federal ownership extending through Wyoming, Utah and Nevada.

Limitations: Smaller Wilderness Areas are included in the data set but do not show at this scale. While this map may aid in coarse correlations, the data is not accurate enough to conduct rigorous spatial analyses using these maps. This map does not show BLM's minerals management responsibilities underlying split-estate (private surface - federal minerals) lands, about 70 million acres, nor our responsibilities for managing allotted Indian mineral estate.

Source: "Federal and Indian Lands" in National Atlas of the United States of America: http://www.nationalatlas.gov/atlasftp.html

Comments: None

BLM Management Responsibilities



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BLM Land within Subbasins

Indicator: Percentage of BLM-administered surface acreage within subbasins. A subbasin (also referred to as a cataloging unit or an 8-digit hydrologic unit code (HUC)) is an intermediate-sized drainage area within the widely accepted United States Geological Survey hierarchical system of hydrologic units. It is an integral unit in the Interior Columbia Basin assessment and subsequent management strategies as well as Unified Watershed Assessments conducted under the Clean Water Action Plan. In addition, the subbasin is used by the Environmental Protection Agency to summarize water quality ratings across the nation. The subbasin is used throughout this prototype whenever appropriate data is available.

Key Findings: There are roughly 800 subbasins in the eleven western states (excluding Alaska). Approximately 250 of the 800 contain at least 20 percent public land. The table below shows the actual number of subbasins with specified amounts of BLM-administered surface acreage.

% BLM land	Number of Subbasins
> 80	27
60 - 79	52
40 - 59	68
20 - 39	105
1 - 19	262

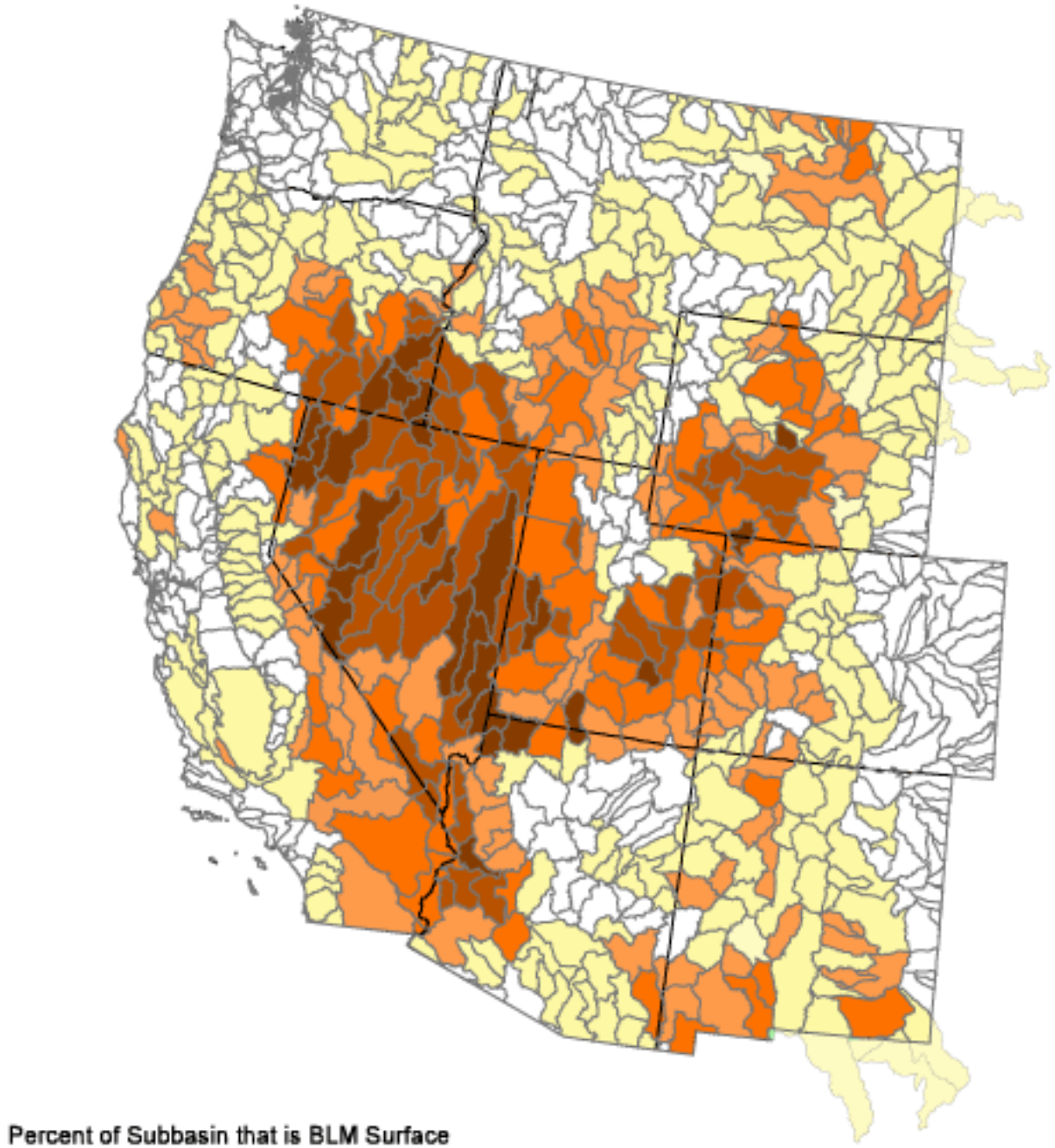
Over half (14 of 27) of the subbasins with more than 80 percent public land are in Nevada. In the 60-79 percent class, over half (30 of 52) of the subbasins are in just two states, Nevada and Utah. When all subbasins with more than 20 percent BLM land are included, nearly half are concentrated in three states: Nevada, Utah, and Wyoming.

Limitations: Subbasin boundaries are available from various sources which can often result in slightly different map delineations. At the scale of this prototype, however, such differences are probably insignificant.

Source: National Atlas of the United States, Federal and Indian Lands theme and Hydrologic Unit Boundaries theme: http://www.nationalatlas.gov/atlasftp.html.

Comments: None

BLM Lands Within Subbasins



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BLM Surface Parcel Size

Indicator: Average size of contiguous blocks of BLM-administered surface by subbasin. A subbasin (also referred to as a cataloging unit or an 8-digit hydrologic unit code (HUC)) is an intermediate-sized drainage area within the widely accepted United States Geological Survey hierarchical system of hydrologic units. Average block size is expressed as sections or townships and multiples thereof. One section equals 640 acres and one township contains 36 sections.

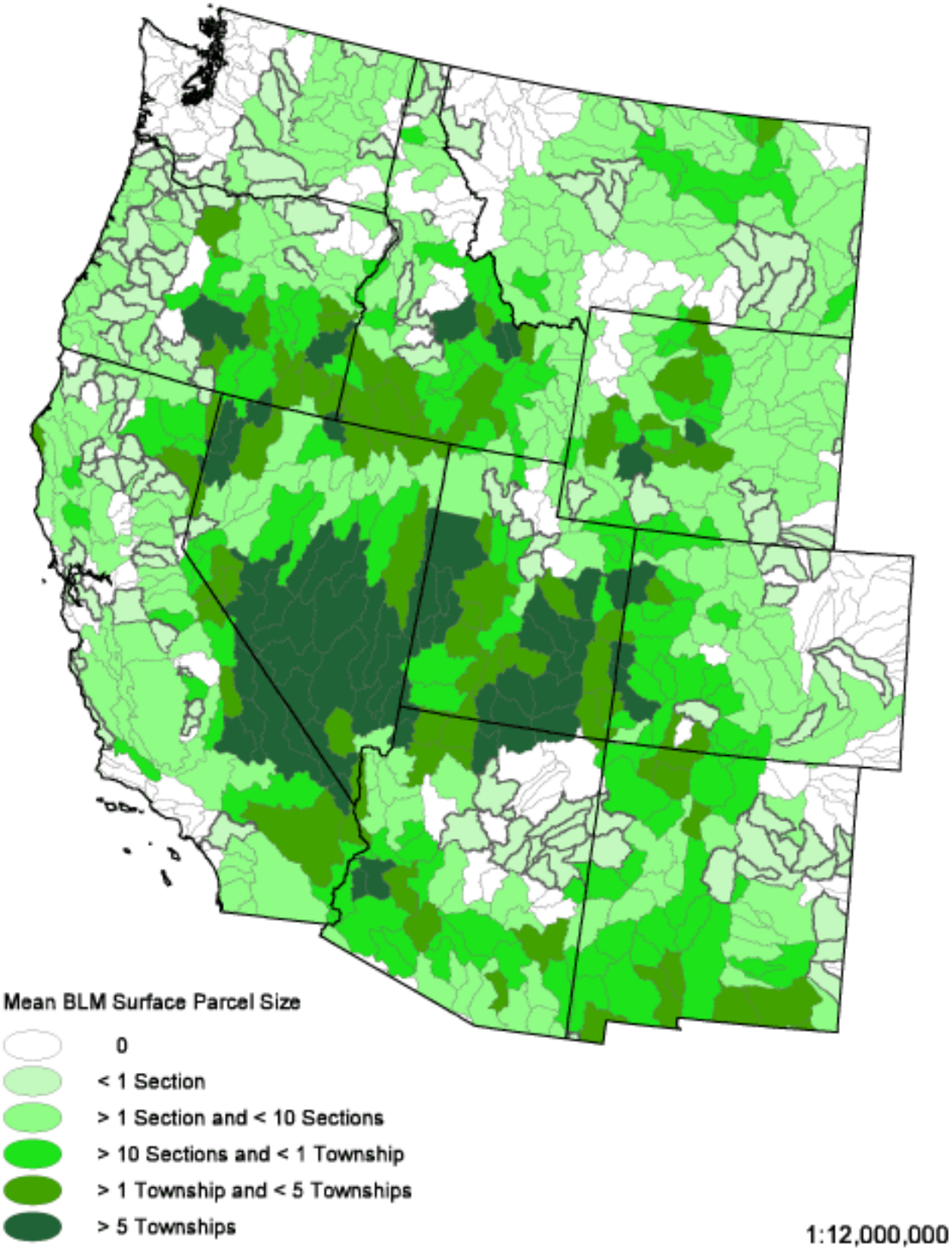
Key Findings: While there is certainly a positive correlation between the amount of BLM land and the average parcel size, careful comparison of this map with the "BLM Lands within Subbasins" map reveals differences as well. Subbasins with the highest amount of BLM land do not necessarily show the largest average parcel size. A subbasin in western Colorado and another in eastern Alaska show less than 40 percent total BLM land with an average parcel size of greater than five townships.

Limitations: This map shows contiguous blocks of surface ownership. It does not show potential fragmentation of the surface that may be caused by uses within each block (e.g., roads, fences, etc.)

Source: National Atlas of the United States, Federal and Indian Lands theme and Hydrologic Unit Boundaries theme: http://www.nationalatlas.gov/atlasftp.html.

Comments: Average surface parcel size may present opportunities for management. For example, larger parcel size may present us with greater management flexibility. In areas where BLM manages small parcels, the need for partnerships with neighboring landowners may be critical to accomplishing management objectives.

BLM Surface Parcel Size



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Vegetation Assemblages

Indicator: General vegetation landcover identified by satellite inventory. Vegetation assemblages are plant communities, shown here grouped by categories of most interest to BLM lands.

Key Findings: Vegetation characterization at this level of detail is a basic descriptor rather than an indicator. Mosts BLM lands are not forested. Rather, they contain primarily arid or semi-arid habitats consisting of shrubs and grasslands. Forested BLM lands occur mostly in the O & C lands in western Oregon.

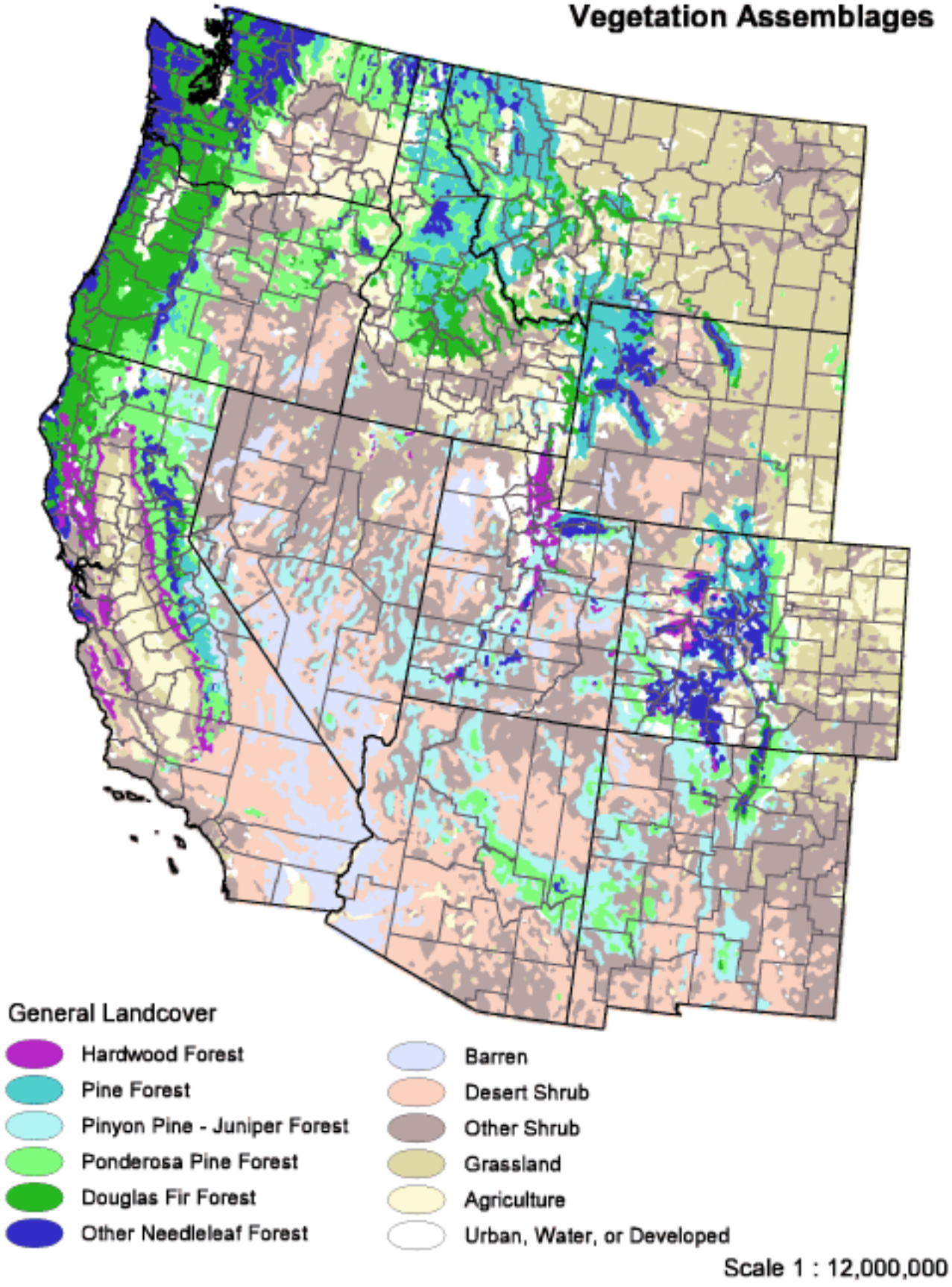
Limitations: It can serve as a communication tool to aid in understanding the nature of the public lands. Beyond that, it is of limited use for land management purposes without meaningful indicators of vegetation condition. The data were originally presented in a greater number of categories, which were reduced to those shown.

Source: Fire Sciences Laboratory, Rocky Mountain Research Station, Missoula, Montana. This data set was produced by combining: (1) non-forest data from the1990 Land Cover Characteristics data set (United States Geological Survey (USGS), Earth Resources Observation Systems (EROS) Data Center); and (2) forest data from the 1992 Forest Resources of the United States data set (United States Department of Agriculture, Forest Service, General Technical Report RM-234). This map presents this data smoothed using a 10x10 cell window.

Comments: The BLM generally lacks vegetation information to form a suitable baseline for monitoring the effectiveness of management actions. Several BLM states and field offices, as well as other agencies, have generated vegetation classifications and maps from satellite imagery (e.g., Advanced Very High Resolution Radiometer (AVHRR), Landsat). Alaska BLM has established a statewide protocol through the Alaska Geographic Data Committee for an ongoing effort to gather suitably accurate data using Landsat imagery. However, over the rest of the Bureau, such efforts have not been well coordinated, and resultant maps are generally not compatible. Other types of BLM vegetation data (for example, ecological site inventories) are not consistent among field offices, provide incomplete coverage, and are often not in a form that permits spatial display and analysis.

Since vegetation is so important in determining the condition of the land, the BLM should re-evaluate its current approach(es) and invest in a new strategy. The goal should be to generate or acquire vegetation data that is: (1) consistent across (at least) regional biophysical units and ownership patterns; (2) detailed enough to provide meaningful indicators of condition; and, (3) sufficiently economical to allow the process to be repeated periodically to document trends. To reach this goal will require interagency cooperation, recognition of existing standards (i.e., Federal Geographic Data Committee National Vegetation Classification Standard,) and a willingness to compromise to achieve a workable level of consistency.

Vegetation Assemblages



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Cultural Sites

Indicator: Number of cultural resources sites recorded by subbasin. This indicator shows where the greatest concentrations of cultural resources are currently known to be located. With the exception of part of Wyoming, the data were aggregated up from 1:24,000 scale site location maps that were either digitized or coordinates interpolated for the points. For those areas of Wyoming where site locations have not been digitized, the number of sites per section was aggregated together and then the sections were linked to the subbasins. Montana's data are displayed at a coarser level than the subbasin (Hydrologic Unit Code 6 rather than 8). This coarser level does not appear to be particularly useful for presenting cultural resources data. The data for all of Arizona and a small part of Nevada exist, but were not submitted as of the deadline.

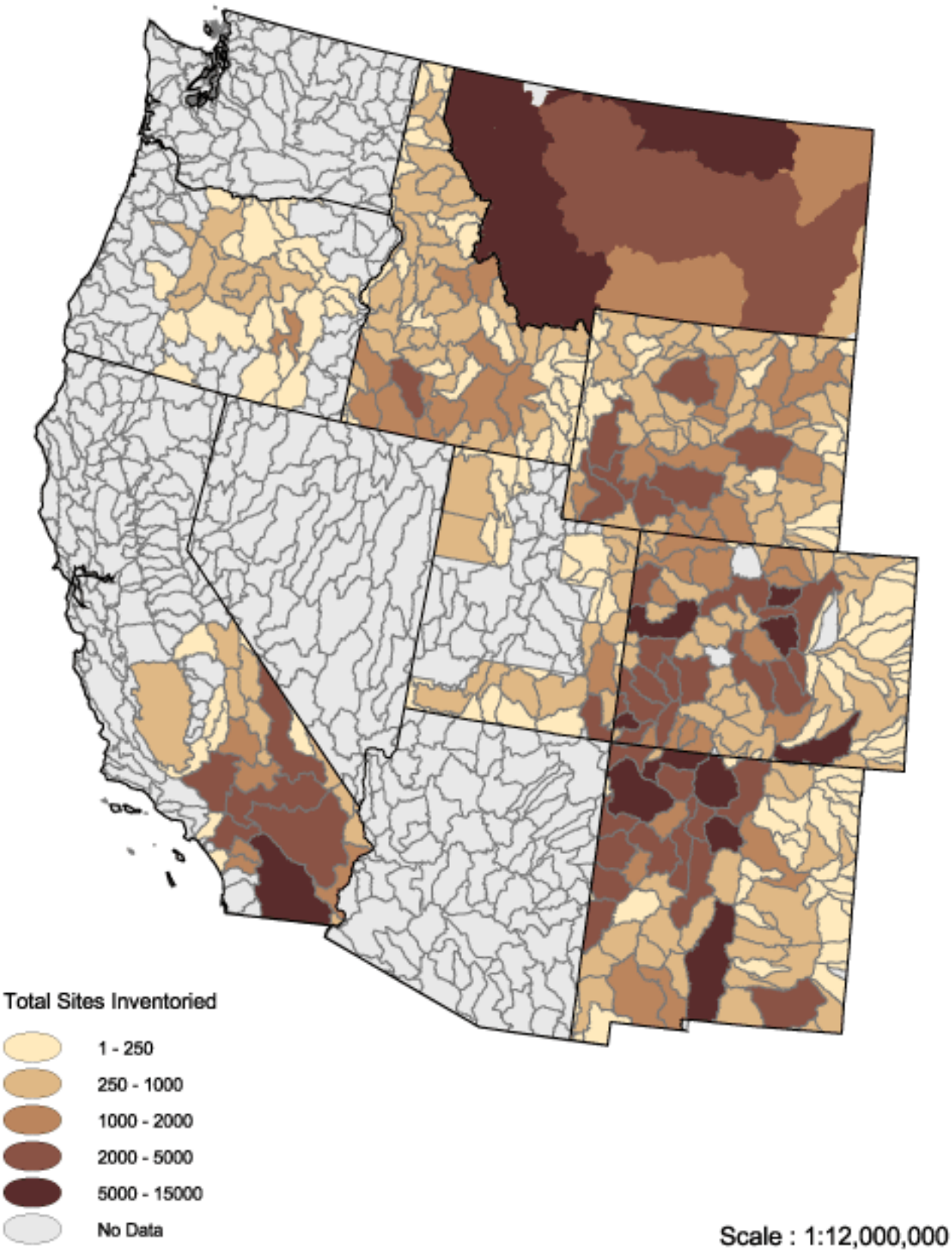
Key Findings: There are extremely large numbers of cultural resources sites recorded in the western states, especially in areas where the public lands are concentrated. The subbasins with the greatest numbers of sites appear to be in areas of greatest mineral development and in the California Desert, which may be an indication of the extensive surveys done in these areas. The maps also seem to show that fewer sites are recorded along state boundaries, which may indicate that fewer surveys are done there.

Limitations: The quality of the data are very good. The number of recorded sites is not necessarily an indicator of how many total sites are in any given subbasin. The data were primarily collected as a result of site-specific inventories performed in response to proposed on-the-ground actions. The data have not been normalized.

Source: In response to a March 2000 written request, the following institutions provided the BLM with the aggregated data (i.e., number of sites per subbasin) for their respective states: University of Redlands California Cultural Resources Information System Project Office; the State Historic Preservation Offices in Idaho, Montana, Wyoming, Utah, Colorado and New Mexico; and the BLM/Forest Service Central Oregon Heritage Group (COHG) Database Project. Except for COHG, these institutions maintain their state's cultural resources inventories and update them on a daily basis. The BLM currently is helping the western states automate those inventories.

Comments: The lack of data for Nevada and Arizona and portions of other states makes it difficult to identify any large-scale correlations with other national indicators. Further analysis is needed to determine if data represent primarily where on-the-ground actions have occurred rather than an actual or estimated total number of sites per subbasin. Some of the western states have the data to make this determination already in an automated database format.

Cultural Sites



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Air Quality

Indicator: Nonattainment Areas (areas with significant existing levels of air pollution) and Class I Areas (clean areas where almost any additional air pollution would be considered significant,) by county. Counties are presented as "in attainment" (i.e., the entire area is within all applicable standards,) "partially in attainment" (i.e., a portion of the area has been demonstrated to violate at least one applicable standard,) or "entirely in nonattainment" (i.e., the entire area has been demonstrated to violate at least one applicable standard.) Class I Area boundaries are presented as established either by Congress or tribal governments.

Key Findings: Every state office and many field offices have nonattainment and Class I areas within their jurisdictions. In the past, most air quality management issues have been associated with minerals development and operations and Bureau-initiated prescribed burns. Several conformity analyses have been prepared in California and Nevada nonattainment areas, and potential Class I Area impacts in the Cascades, Rocky Mountains and Four Corners region have been a concern.

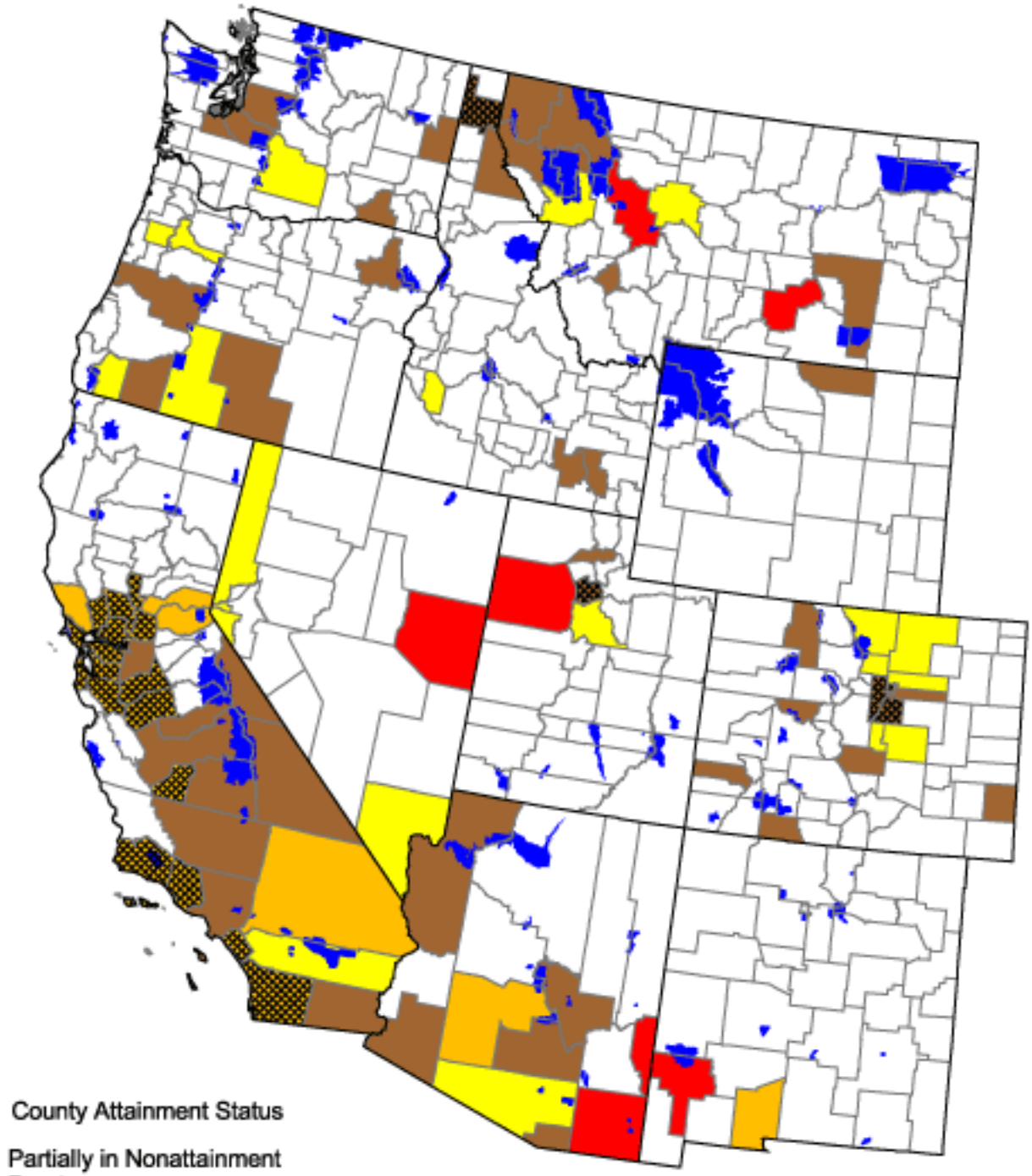
Limitations: The Environmental Protection Agency (EPA) revises nonattainment area boundaries regularly, but given periodic changes in the standards and the non-automated form of the record, generating meaningful trends is unlikely. Class I Area data were assembled from several different sources, with National Park Service (NPS) caveats regarding data accuracy. In addition, several Class I Areas are too small to be seen on broad scale maps.

Source: The nonattainment area data and maps were obtained from the EPA website: http://www.epa.gov/agweb/nonat.html; Class I Area data were obtained from the NPS website: http://www2.nature.nps.gov/ard/parkhp.html.

Comments: The air quality status on and near the public lands is significant because the Bureau must: (1) conduct a regulatory Conformity Analysis and Determination within designated nonattainment areas prior to implementing actions, (2) comply with applicable Class I Area air pollutant limits, and (3) may need to determine if activities would cause significant visibility impacts. Activities that impact either nonattainment or Class I areas are likely to cause public concern and require additional National Environmental Policy Act analysis. All activities conducted within EPA designated nonattainment areas are subject to regulatory air pollutant emissions limitations. There are currently ten different standards for six different pollutants, with two additional standards under review. The total additional amount of nitrogen dioxide, particulate matter, and sulfur dioxide is also limited within Class I Areas. All Bureau authorized or conducted activities must comply with these requirements (40 CFR 51.850 and 43 CFR 2801.2(b)(2)).

The single map showing all counties with even partial nonattainment status for any applicable air pollutant could be replaced with multiple maps for individual air pollutants, and the precise boundaries could be digitized. The Bureau could also generate higher quality individual Class I Area maps. However, it is unlikely more specific or precise maps would justify the labor and financial requirements necessary to refine and digitize these large scale maps.

Air Quality



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Water Quality

Indicator: Environmental Protection Agency (EPA) Index of Watershed Indicators (IWI). This index rates the condition and vulnerability of aquatic systems across the United States. It incorporates 16 data layers: seven for condition and nine for vulnerability. These layers include State/Tribal reports from section 305(b) of the Clean Water Act (meeting designated uses), presence of various toxics and pollutants, wetland loss, species at risk, urban and agricultural runoff potential, *etc*. A full listing and description of each layer can be found at: http://www.epa.gov/iwi/national/index.html. Overall scores are portrayed by subbasin (8-digit hydrologic unit), some of which have insufficient data to assign a rating. The map shows ratings for the subbasins that have at least 20 percent BLM-administered surface acreage.

Key Findings: At present, none of these subbasins has high vulnerability. Therefore, the map only portrays the three condition classes, all of which correspond to low vulnerability. Of the 253 subbasins that are displayed, 114 have insufficient data to be assigned a condition rating. Of the remaining 139 subbasins, 20 show the highest (best) rating, 52 fall in the intermediate class, and 69 warrant the lowest (worst) rating.

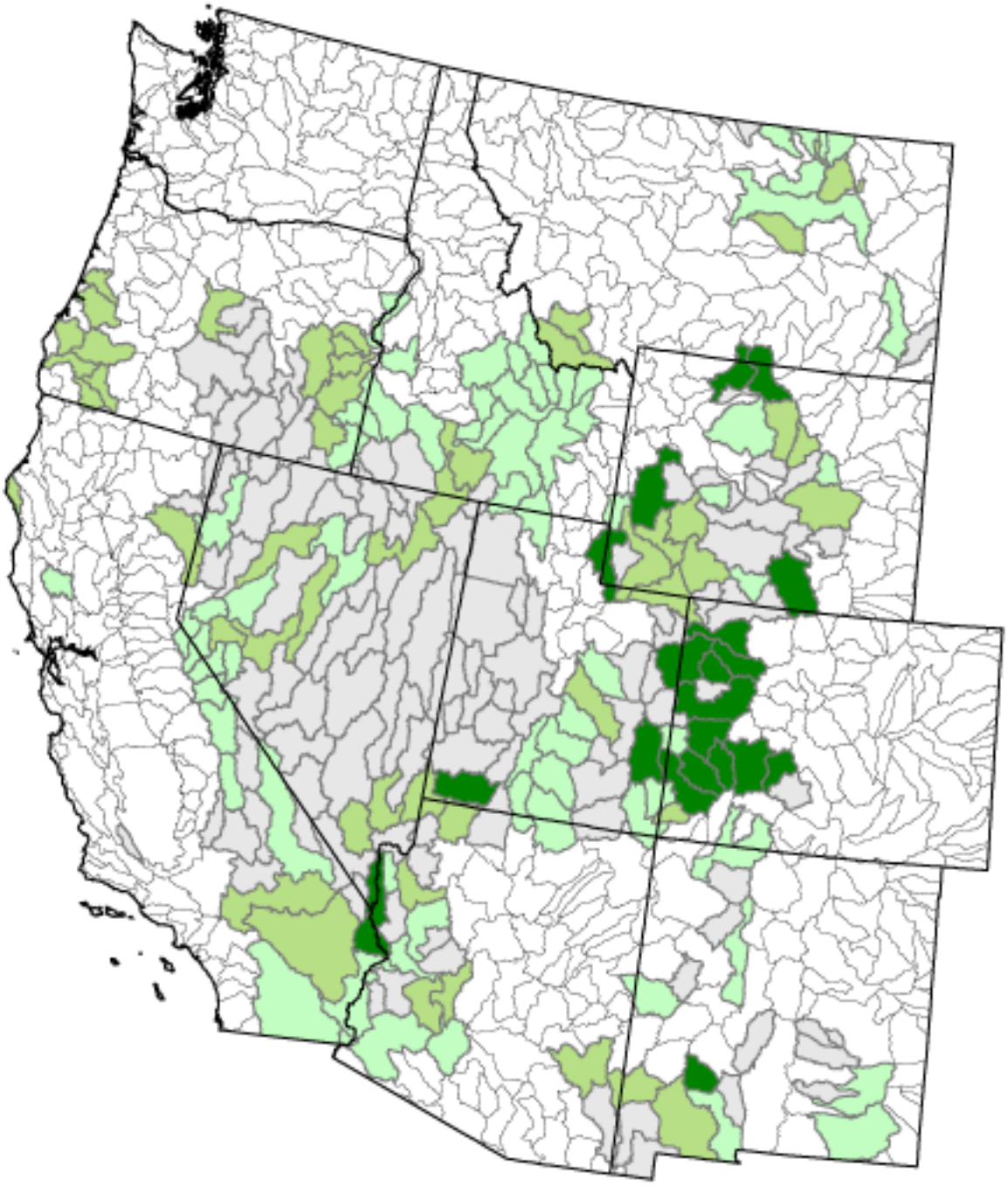
Because this index is a composite of several factors, it is important to determine the reason(s) for the assigned rating for any given subbasin, This can be done on the web. To do so, go to: http://www.epa.gov/surf3/locate/map2.html to select the state and subbasin of interest. Click on "Index of Watershed Indicators" to see the summary rating. Then click on "Condition and Vulnerability Indicator Graphs" to view the rating for each individual data layer. For example, the Middle Humboldt subbasin in north-central Nevada is rated as having "more serious water quality problems." This subbasin has more than 80 percent BLM surface. Closer analysis reveals that the rating is due to not meeting all designated uses, not meeting community water source standards (before treatment), and exceeding reference levels for ambient water quality. To a lesser degree, wetland loss is also a contributor. The extent to which BLM-administered lands contribute should be carefully analyzed at the state and field office levels.

Limitations: Many of the included data layers include inconsistent and/or incomplete data and not all of the contributing elements are equally pertinent to wildlands. In addition, the overall rating is heavily influenced by one particular layer, the State and Tribal 305(b) reports (6x weighting factor). Nevertheless, this index is widely available and provides a much-needed comparative view across administrative boundaries.

Source: EPA website: http://www.epa.gov/iwi/1999sept/catalog.html. This indicator is based on the most recent IWI data release by the EPA (September 1999).

Comments: To date, there have been five releases of the IWI beginning in October 1997. New data layers are regularly introduced and there are currently four additional "candidate" layers being reviewed for possible inclusion.

Water Quality



EPA Index of Watershed Indicators
for areas with > 20% BLM Surface

- Better Water Quality
- Less Serious Water Quality
- More Serious Water Quality
- Data Sufficiency Threshold Not Met

Scale 1:12,000,000

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Riparian Condition - "Acceptable"

Indicator: Percent of riparian in "acceptable" condition by BLM field office. This indicator is based on the Proper Functioning Condition (PFC) rating, described in BLM Technical Reference 1737-9 (1993). As applied here, it is limited to areas associated with running water (rivers and streams vs. lakes and ponds). The rating includes three main categories: PFC, functional-at-risk (FAR), and nonfunctional (NF). The FAR category is further subdivided by trend: up, not apparent, or down. An additional category denotes the amount of riparian that is unrated. This map combines the miles in PFC and FAR with trend up. This represents the number of miles that are already in or are approaching an "acceptable" condition.

Key Findings: Riparian condition data can be compiled in several ways. Expressed as a percentage of total riparian miles (including unrated miles), the average over the eleven western states is 51 percent. Expressed as a percentage of assessed miles (excluding unrated), this value increases to 56 percent. Comparable values for Alaska are 91 and 99 percent, respectively.

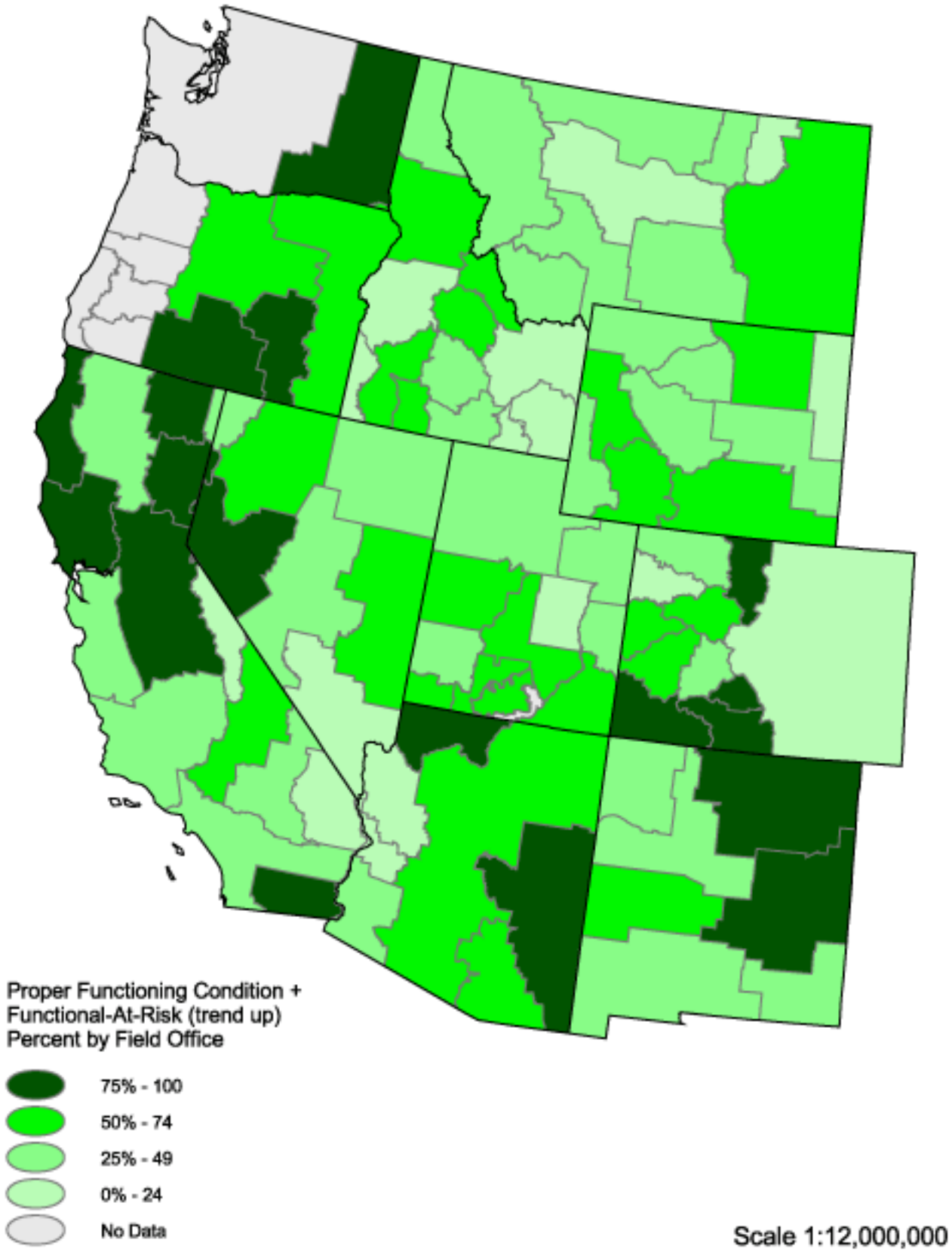
On this map, with unrated miles included, nineteen field offices meet or exceed the 75 percent. If unrated miles are excluded, three additional offices (Buffalo, Wyoming; Coeur d'Alene, Idaho, and Palm Springs-South Coast, California) are added. Comparable PFC ratings for western Oregon are not available. However, riparian areas in these field offices are already subject to intensive management under the aquatic conservation strategy in the Northwest Forest Plan. State summations by field office for California and Montana are significantly lower than the state totals reported in Public Land Statistics. In Montana, this is likely due to a data entry backlog in the centralized system maintained at the University of Montana. These data should be updated by the end of September 2000. The discrepancy in California has not yet been resolved.

Limitations: The PFC rating is based on several physical and vegetative features. Other biotic characteristics that may be important in characterizing overall condition (e.g., specific animal presence and abundance) are not now included although an interagency effort is currently underway to do so. The benefits of these additional elements will have to be weighed against the added time and expense to gather associated data. The PFC rating by itself does not necessarily highlight those areas with the greatest opportunity for improvement. Such determinations must be made by on-the-ground managers and specialists with more detailed knowledge of public land distribution and pattern, site capability, other resource and adjacent land conditions, available partnerships, etc.

Source: BLM field office records. These data represent an initial riparian assessment completed over a period of several years. Randomly selected sites are currently being reassessed to determine change and the effectiveness of applied management.

Comments: The PFC rating is considered a good indicator of riparian conditions when applied consistently. It has a standardized protocol that is accepted and used by other agencies, watershed councils, and universities. Its utility will grow as data are digitized, allowing riparian condition to be portrayed more meaningfully by smaller geographic units (e.g. subbasins, watersheds.)

Riparian Condition - "Acceptable"



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Riparian Condition - "Unacceptable"

Indicator: Miles of riparian in "unacceptable" condition by BLM field office. This indicator is based on the Proper Functioning Condition (PFC) rating, described in BLM Technical Reference 1737-9 (1993), which is limited to areas associated with running water (rivers and streams vs. lakes and ponds). The rating includes three main categories: PFC, functional-at-risk (FAR), and nonfunctional (NF). The FAR category is further subdivided by trend: up, not apparent, or down. An additional category denotes the amount of riparian that is unrated. This map portrays the actual number of miles in "unacceptable" condition - namely FAR with trend not apparent or down plus NF. Note that the previous map portrays riparian in "acceptable" condition as a percentage of the total miles.

Key Findings: The number of miles of riparian in "unacceptable" condition varies widely across the west. At the low end of the scale, there are 39 field offices with less than 50 miles in "unacceptable" condition, while five field offices have over 400 miles each. Although not shown on the map, the North and South Dakota Field Offices have 31 and 98 miles, respectively.

These numbers can be somewhat misleading when considered alone. By comparing the two riparian condition maps, there are areas that show a relatively low number of miles in "unacceptable" condition, and at the same time, a low percentage in "acceptable" condition (e.g. Las Vegas, Nevada; Price, Utah). This is not too surprising in an arid area like Las Vegas where the total number of riparian miles is low (31 miles). However, in a wetter area like Price, Utah, combining "unacceptable" with unrated condition provides a more complete picture. Price has 664 unrated miles added to 129 "acceptable" out of an estimated total of 838 miles. Thus, the percentage in "acceptable" condition is relatively low (15 percent) while the miles of "unacceptable" are also relatively low (45) due to the large number of unrated miles. The distribution of unrated miles is not mapped separately. However, there are approximately 2,700 miles of riparian that are currently unrated. More than half of these are concentrated in four field offices - Price (664 miles) and Moab, Utah (402 miles), Elko, Nevada (215), and Vernal, Utah (175).

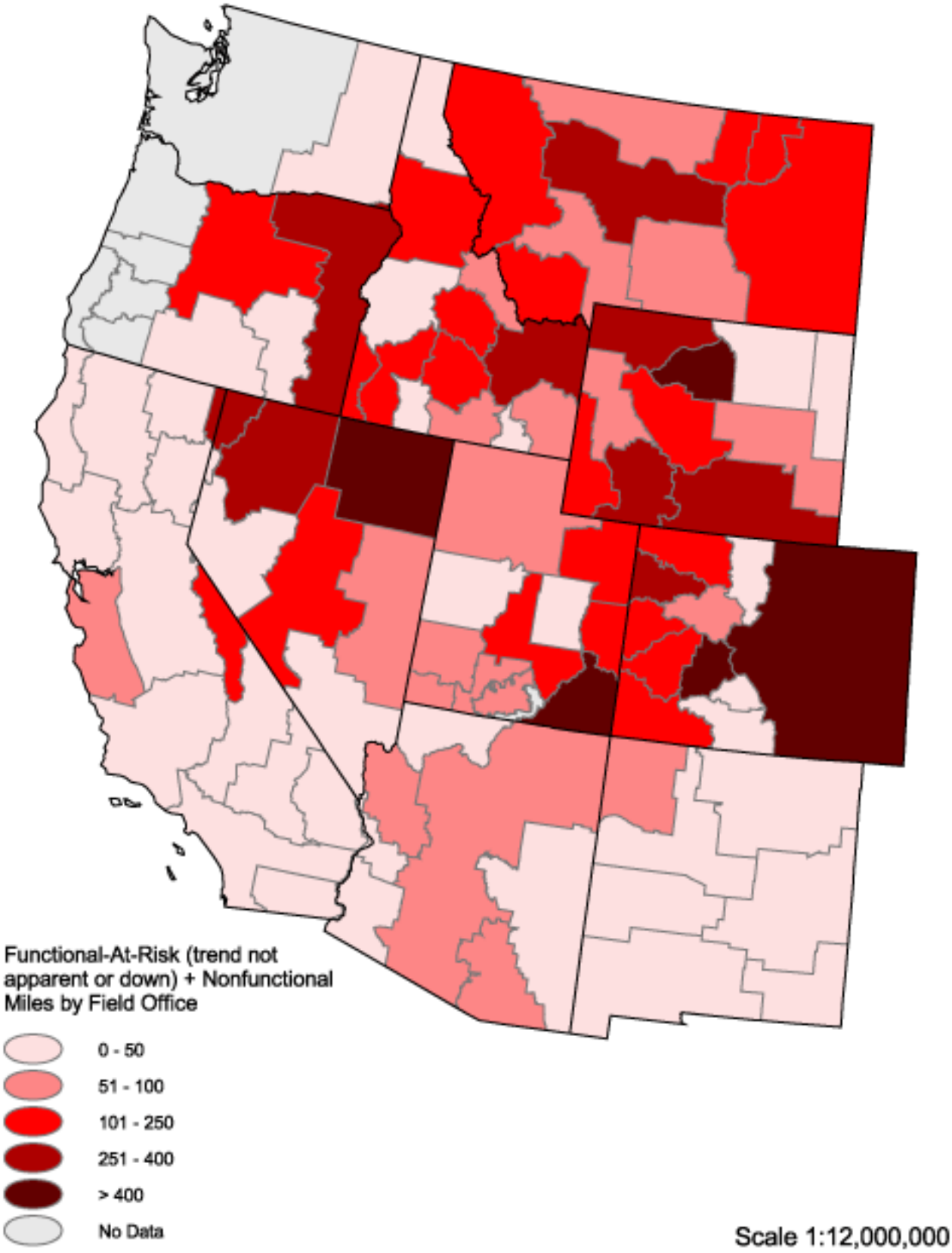
Comparable PFC ratings for western Oregon are not available. However, riparian areas in these field offices are already subject to intensive management under the aquatic conservation strategy in the Northwest Forest Plan. State summations by field office for California and Montana are significantly lower than the state totals reported in Public Land Statistics. In Montana, this is likely due to a data entry backlog in the centralized system maintained at the University of Montana. These data should be updated by the end of September 2000. The discrepancy in California has not yet been resolved.

Limitations: (see Riparian Condition - "Acceptable")

Source: (see Riparian Condition - "Acceptable")

Comments: (see Riparian Condition - "Acceptable")

Riparian Condition - "Unacceptable"



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Special Status Species

Indicator: Number of species federally listed as threatened or endangered, including proposed and candidate species, on both public and private lands, by county. The BLM addresses the conservation and protection of plants and animals that are federally listed, proposed, or candidates for listing as threatened and endangered. The BLM also includes species designated as BLM sensitive in the category of special status species. BLM sensitive species (not included on this map) includes plants and animals warranting conservation action because of their declining abundance or occurrence, vulnerability to human-related activities, or other associated problems.

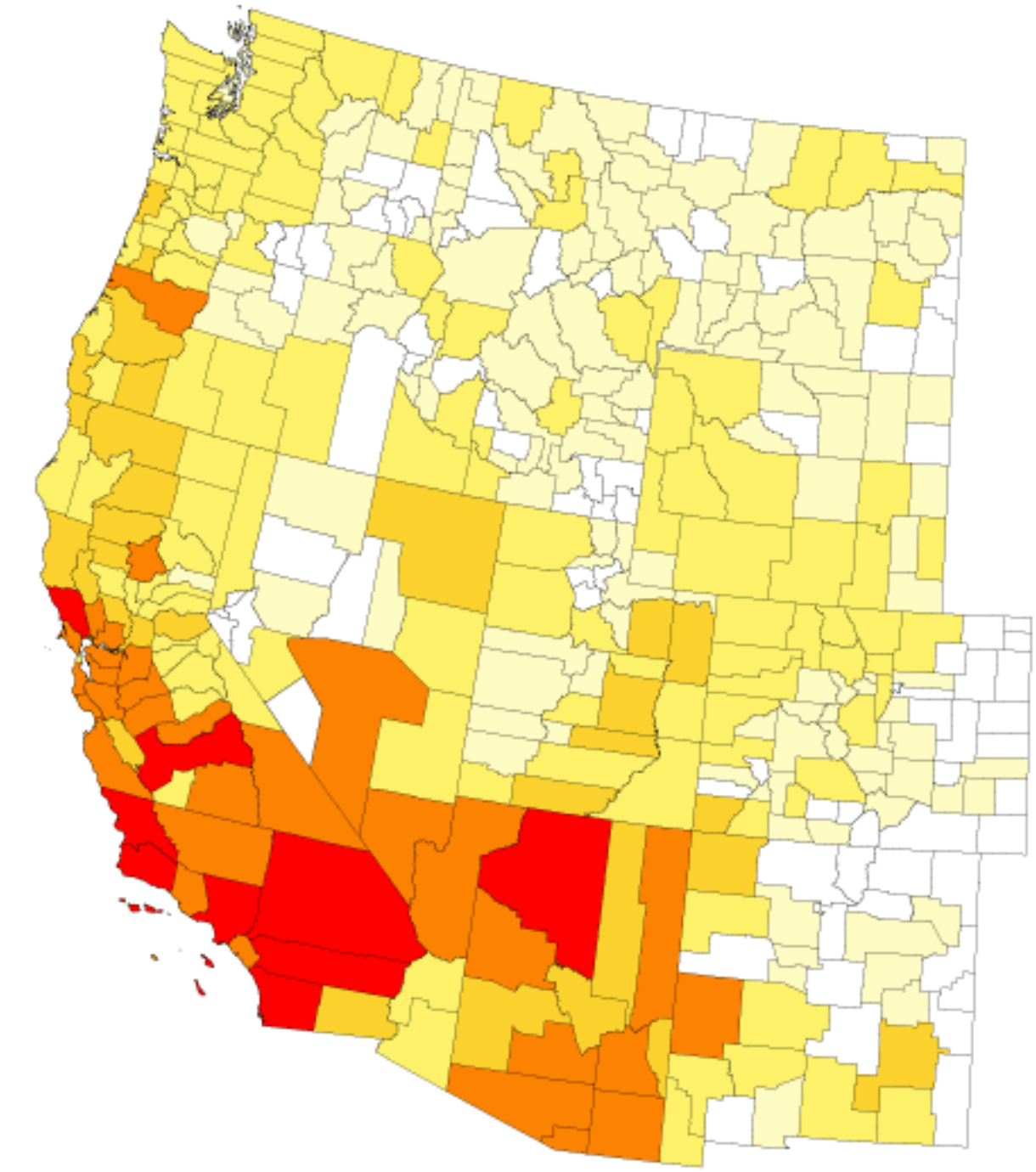
Key Findings: Public lands managed by the BLM support 228 species of plants and animals federally listed as threatened or endangered, 68 species proposed for listing, and 71 that are candidates for listing. Although not shown on the map, an additional 1500 species are designated as BLM sensitive. The map highlights those areas that contain relatively high numbers of listed, proposed, and candidate species, which may suggest unhealthy habitats. Further investigations are needed to determine causal factors and thus better guide management decisions.

Limitations: In some areas, the numbers of species alone will have little meaning. Because of large differences in county size, a county map is of limited use to show the relative distribution of special status species over the landscape. Species that appear in the same county may likely require different habitats. Furthermore, a county map cannot adequately distinguish those species with distributions that overlap many counties from those that appear in relatively small areas. Because site specific data for BLM lands are lacking, the best source for this information was external which did not differentiate between species occurring on and off BLM-managed lands. In addition, the data portrayed are incomplete as the 1500 BLM sensitive species are not included.

Source: This information is excerpted from Stein, B.A., Kutner, L.S., and Adams, J.S eds. 2000. *Precious Heritage: The Status of Biodiversity in the United States.* Oxford University Press, New York., with permission granted by The Nature Conservancy (http://www.tnc.org) and the Association for Biodiversity Information (http://www.abi.org).

Comments: The Association for Biodiversity Information will be able to provide more detail on BLM specific species in the future. Also, BLM's long term strategic goal is to develop baseline information for 40 federally listed/proposed and twenty BLM sensitive species each year for the next five years.

Special Status Species



Threatened and Endangered Species
also includes Proposed and Candidate
1997

	0		7 - 10
	1 - 2		11 - 20
	3 - 6		21 - 36

1:12,000,000

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Fire Frequency and Land Condition

Indicator: Fire Frequency and Land Condition. The western U.S. map shows the relative risk of losing one or more key components that define an ecological system based on departures from the historic natural fire regime and ecosystem attributes such as hydrologic function. This relative risk rating is shown for three fire regimes: frequent fires (recurring 0-35 years), common (35-100 years), and infrequent (200+ years).

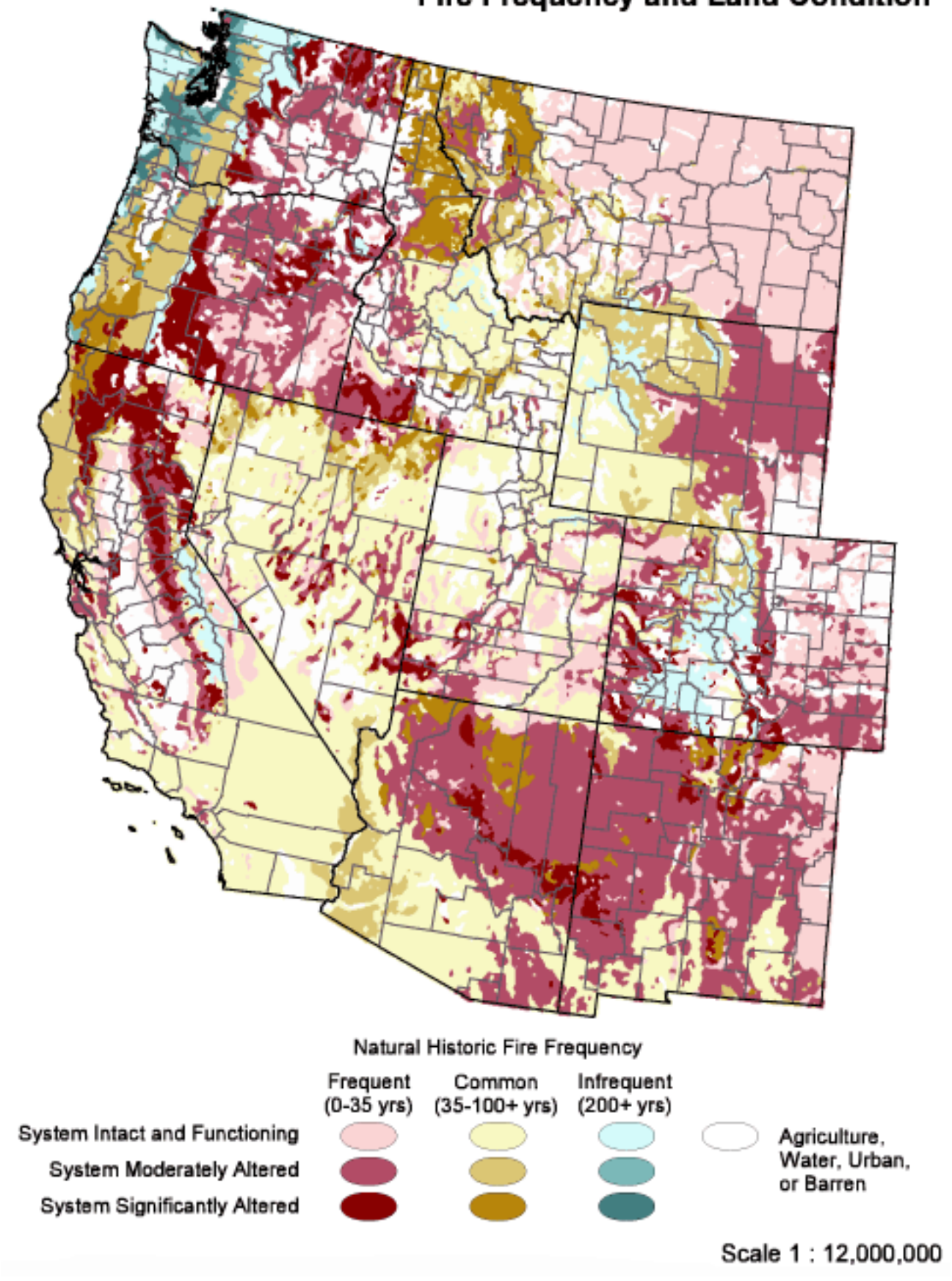
Key Findings: Elko, Nevada, serves as an example for understanding this map. In this region cheatgrass has invaded the sagebrush systems so extensively that fires occur with greater frequently (annually) than the historic natural regime (35-100+ year return time) would indicate.

Limitations: This map shows fire frequency on a landscape scale. Local areas should be reviewed carefully for factors that may indicate a change in fire frequency or land condition.

Source: Coarse-scale Spatial Data for Wildlife Fire and Fuel Management (November 1999), produced by Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station. Available at: **http://www.fs.fed.us/fire/fuelman**. This map presents this data smoothed using a 10x10 cell window.

Comments: Modified systems clearly change the natural fire history of an area. The example provided above with Elko, Nevada, provides context in how the landscape has been modified and non-native vegetation that is more prone to fire becomes the dominating factor in determining the frequency of such fire. The ephemeral ranges of the desert southwest are another example of modification of fire frequency. The joshua tree and creosote bush ranges have an invaded understory of annual cheatgrass which is highly flammable when dry. When these areas are burned, the joshua tree and creosote bush are often damaged beyond recovery, leading to an even greater potential of annual vegetation establishment.

Fire Frequency and Land Condition



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Weed Distribution

Indicator: Number of infested acres, both inventoried and estimated, of invasive plant species on BLM lands by state or, when available, by county. These invasive plant distribution estimates indicate the magnitude of the weed problem.

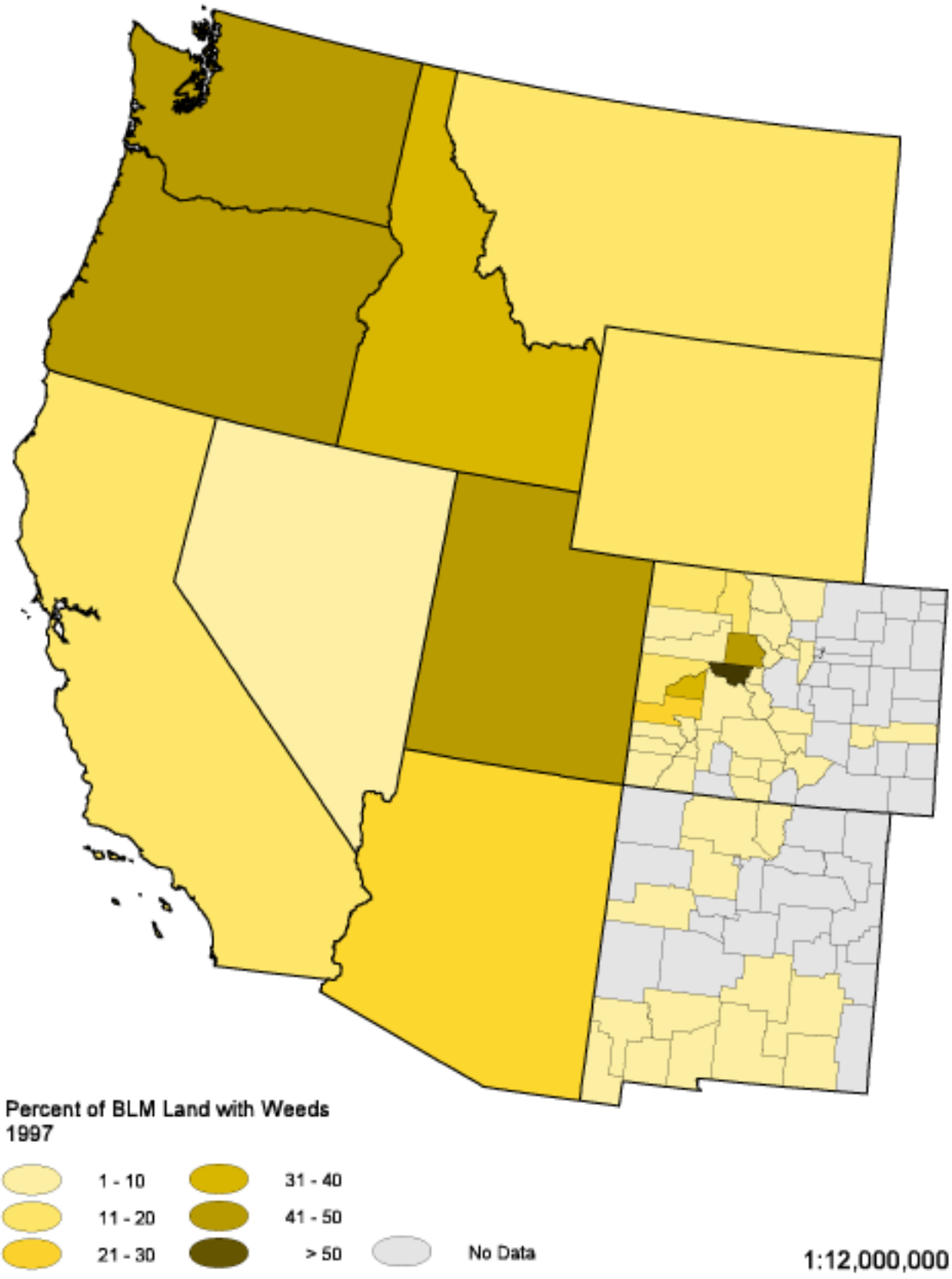
Key Findings: While this map reveals a serious lack of data, it does indicate the severity of the problem by the large number of acres infested. Detailed inventories, if available, would tell us where small, new weed infestations are located. Without this knowledge, the Bureau is blocked from using the most effective weed control technique, which is to find and eradicate new, small infestations of noxious weeds. Even given the caution about using the acreage figures it is clear that the Bureau has a substantial problem with invasive weed species on public lands. At face value, the figures would indicate that about twenty percent (36,126,923 acres) of the public lands in the twelve reporting states have some degree of weed infestation.

Limitations: Cautions that must be considered when viewing the information include the following: about 99.5 percent of the information is based upon gross estimates; estimates can vary greatly from year to year due to climatic changes and associated effects on the abundance of individual weed species; variations exist in interpreting what constitutes an infested acre; and more than one species of weed may occur on the same acreage, which results in over-reporting the total acres infested. Nonetheless, several state weed coordinators have said that some estimates appear to be conservative, and that there are more infested acres than the field offices reported. This is not an indicator for non-plant invasive species.

Source: BLM sent out an Instruction Memorandum in 1997 asking for existing information from previous on-the-ground inventories or any information from Fiscal Year (FY) 1997 inventories. If there were no such inventories, the state weed coordinators were instructed to give an estimate of acres infested with non-native invasive plants (BLM Instruction Memorandum No. 97-130, "Weed Inventory/Mapping in FY 1997.") Many of our field offices are in the process of completing a more accurate inventory of their five - fifteen highest priority weed species.

Comments: Invasive weeds are spreading on BLM lands at an approximate rate of 2,300 acres per day. Nevertheless, it is important to remember that 95 percent of BLM lands are not yet significantly infested. Therefore, it is imperative that the Bureau apply effective and economical strategies immediately to protect those lands from weed infestation.

Weed Distribution



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Special Recreation Permits

Indicator: Special Recreation Permits (SRPs) active during Fiscal Year 1999 by BLM field office. SRPs are issued for commercial, competitive, organized group activities and events, and special area events. These are recreation activities that occur on the public lands such as river rafting, outfitters and guides (including hunting, fishing and ecotourism) organized bike racing, and off-highway vehicle (OHV) events. This map does not show permits issued for individual non-commercial use.

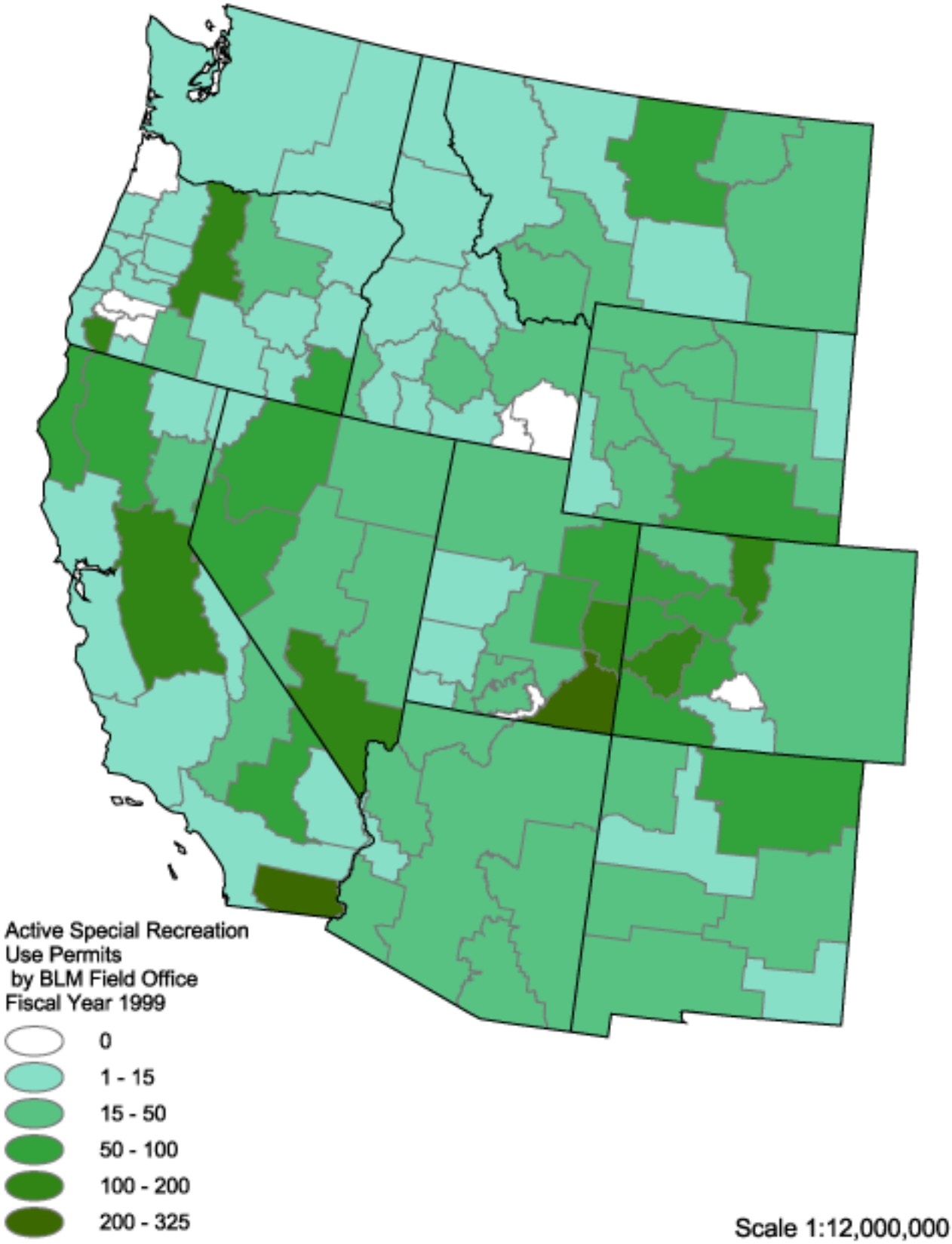
Key Findings: This is a direct measure of permitted recreation use. This is also an indirect indicator of the total recreational use of the public lands, most of which does not require a permit. However, where rivers are at carrying capacity (as established by plan), for example, there can be no more rafting permits issued. Some of the areas with the largest number of SRPs (over 200) reflect the popularity of river rafting and competitive OHV events.

Limitations: The data have not been normalized against the amount of public land in each field office. Therefore impacts are generally proportional to the number of SRPs within any single area, with the notable exception of where carrying capacities for any activity have been reached. Most recreational use does not require a permit, therefore the map may greatly under- or overstate actual usage for any one area. River areas, such as along the Colorado River where river rafting is popular, may have their impacts concentrated along the river corridor. Areas with zero permits may reflect loss of data due to a recent database rehost.

Source: BLM Recreation Management Information System (RMIS). The data are updated on at least an annual basis by individual field offices. The database is centralized and located in Phoenix, AZ, and maintained through a web-based application using the BLM's intranet. SRPs in this database represent the most reliable source of data available for recreation use on the public lands. Other records within RMIS are in need of cleanup or more frequent updating.

Comments: Impacts from recreation are positive in that it can help support local economies, increase public awareness and understanding of land management issues, and provides psychological benefits to individuals. Negative impacts may include increasing soil erosion, vegetation damage, and noise due to OHV use and other motorized forms of transport. Increased human presence can disrupt wildlife breeding habits and fragment wildlife habitat.

Special Recreation Permits



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Oil and Gas Applications for Permit to Drill

Indicator: Number of Oil and Gas Applications for Permit to Drill (APDs) approved from October 1, 1996, through March 3, 2000, by BLM field office. All APDs approved on federal and Indian lands are included. The vast majority are APDs approved on BLM surface lands, followed by Indian, split estate, and National Forest System lands.

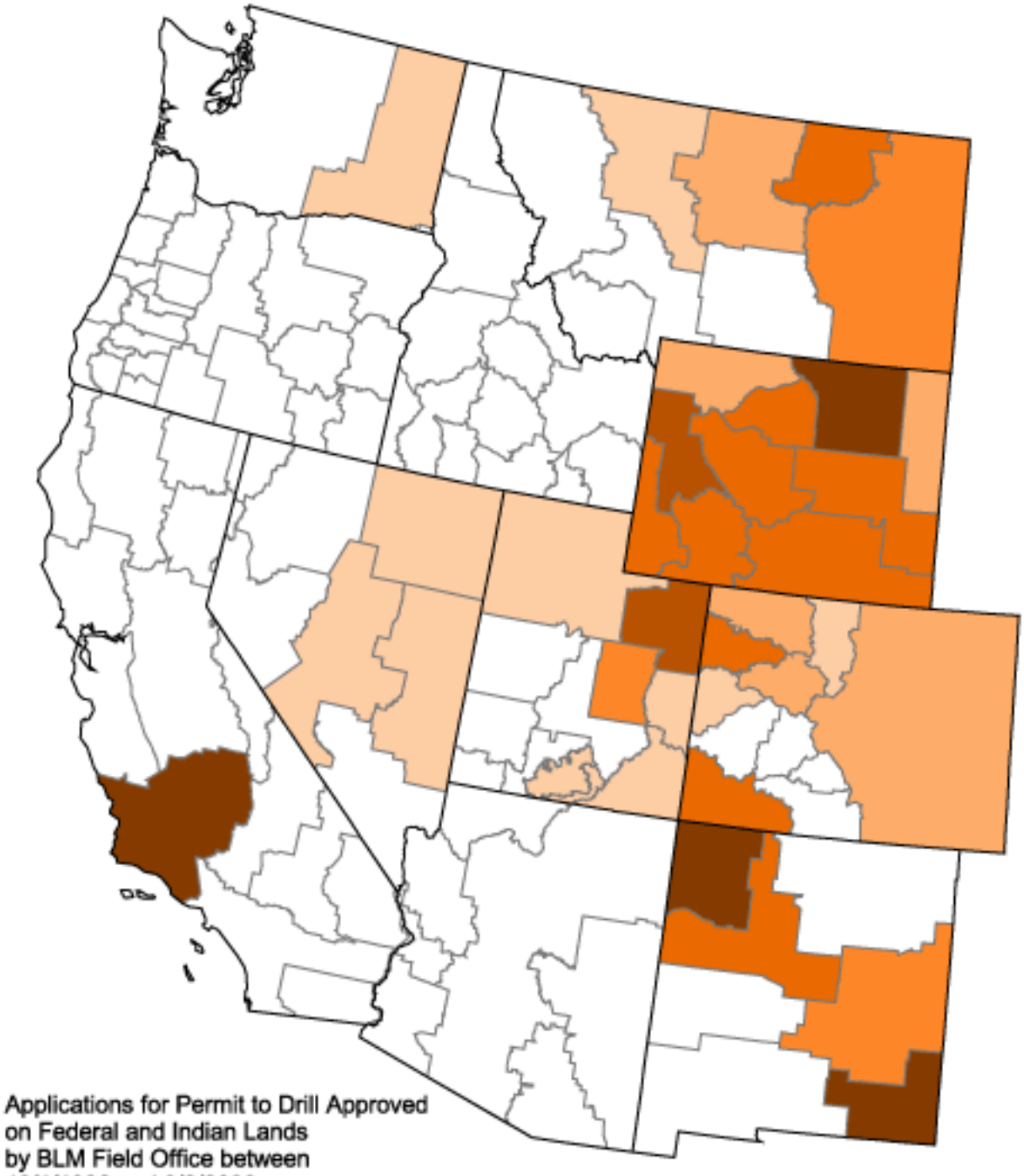
Key Findings: This indicator roughly reveals the level of impacts that are occurring on federally-managed mineral estate due to new oil and gas exploration. Surface disturbance includes well pad, road and pipeline construction. While uncommon, environmental impacts could include possible groundwater contamination by drilling fluids, oil spills, blowouts and fires. There is a less direct correlation with post-drilling impacts that may occur. Hot spots in Wyoming, Utah, and northwestern New Mexico reflect a surge in drilling coalbed methane wells. California has experienced increased activity due to royalty rate reductions for heavy oil and stripper wells. Southeast New Mexico's activity is due to conventional oil well drilling and has been consistently high for some time.

Limitations: Most but not all APDs result in actual drilling operations. Of those, a highly variable percentage are completed for production; the remainder are plugged and abandoned and the well pads and roads reclaimed. Wells drilled from APDs approved on BLM-managed mineral estate are a small percentage of oil and gas development on private and state minerals, which generally have greater environmental and economic impacts. Activity from year to year can be highly variable. The 3.5 year time period shown was used to smooth out that variation. This interval was also chosen to coincide with the period of high confidence in the reported numbers, beginning shortly after the initial implementation of the database.

Source: BLM Automated Fluid Minerals Support System (AFMSS). These data are entered by 31 BLM field offices and updated as activity warrants, often on a daily basis. Good data for APD and other operations activities are available from shortly after AFMSS implementation to the present.

Comments: Other indicators that could be used include total number of active wells, wells actually started (spudded), wells completed for production, or number of operator non-compliance incidents or accidents that result in surface impacts.

Oil and Gas



Applications for Permit to Drill Approved
on Federal and Indian Lands
by BLM Field Office between
10/1/1996 and 3/3/2000

- 0
- 1 - 35
- 35 - 75
- 75 - 150
- 150 - 500
- 500 - 1000
- 1000 - 1900

Scale 1:12,000,000

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Land Use Conversion

Indicator: Land Use Conversion by county, from 1992 to 1997. This indicator portrays the amount of non-federal land moving from non-use or agricultural use to more intensive developed land (urban areas and rural transportation land) between 1992 and 1997.

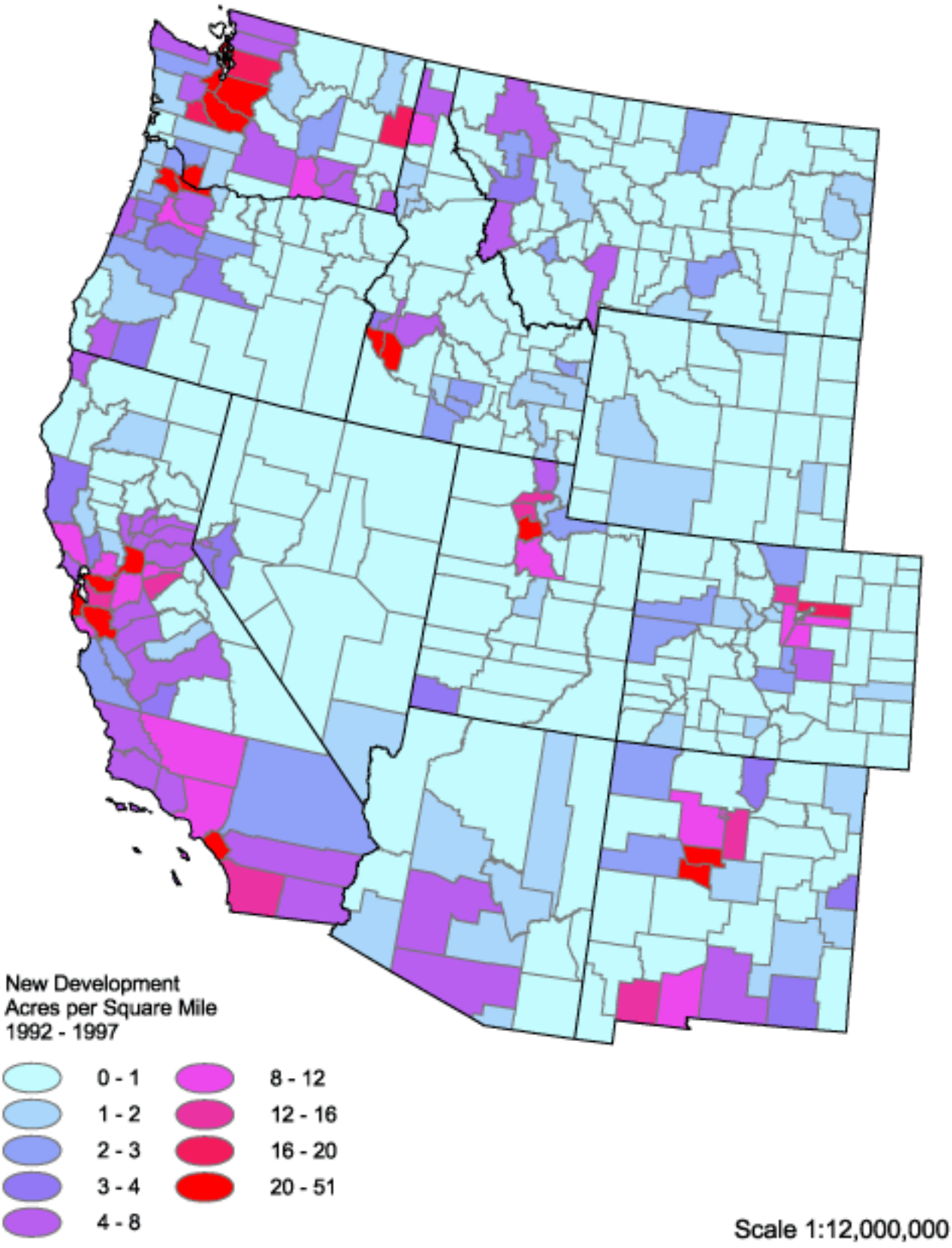
Key Findings: The Natural Resources Conservation Service estimates that 15,966,000 acres were converted in the western states between 1992 and 1997. They further estimate that 5,521,800 acres of conversion, or about one-third, occurred in non-metropolitan areas. No regional generalizations are apparent concerning BLM lands and non-federal land use conversion. However, one area of potential interest lies on the western border of Idaho where very rapid land conversion has occurred adjacent to subbasins with 60-80 percent BLM land and in proximity to areas with relatively high population density. This combination could produce significant pressure on these public lands as people may view them as sanctuaries from urbanization for both humans and wildlife. Opportunities to form partnerships may arise out of the pressures associated with urbanization and the need to manage growth.

Limitations: This information reflects only broad national trends in land conversion. It is based on National Resources Inventory (NRI) sample data, and is only considered reliable for state and certain broad substate area analysis. The sampling design applied is not capable of picking up sparse development, such as 35 acre ranchettes.

Source: USDA Natural Resources Conservation Service - 1992 and 1997 National Resources Inventory (NRI); ASCII Data File is available for products 5123 and 5124 "New Developed Land . . ." http://www.nhq.nrcs.usda.gov/land/index/urban.html.

Comments: None.

Land Use Conversion



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Economic Dependency

Indicator: Economic dependency by county. This indicator is based on income data from six economic sectors over three consecutive years. Resulting information is portrayed in ten categories corresponding to each of the six sectors (farming, mining, manufacturing, government, service, and non-labor), three combination categories, and one for non-dependency (i.e., diversified). The non-labor sector includes income such as interest, Social Security payments, and rents. BLM resource programs are reflected in farming (grazing), mining (solid and fluid minerals), and service (recreation).

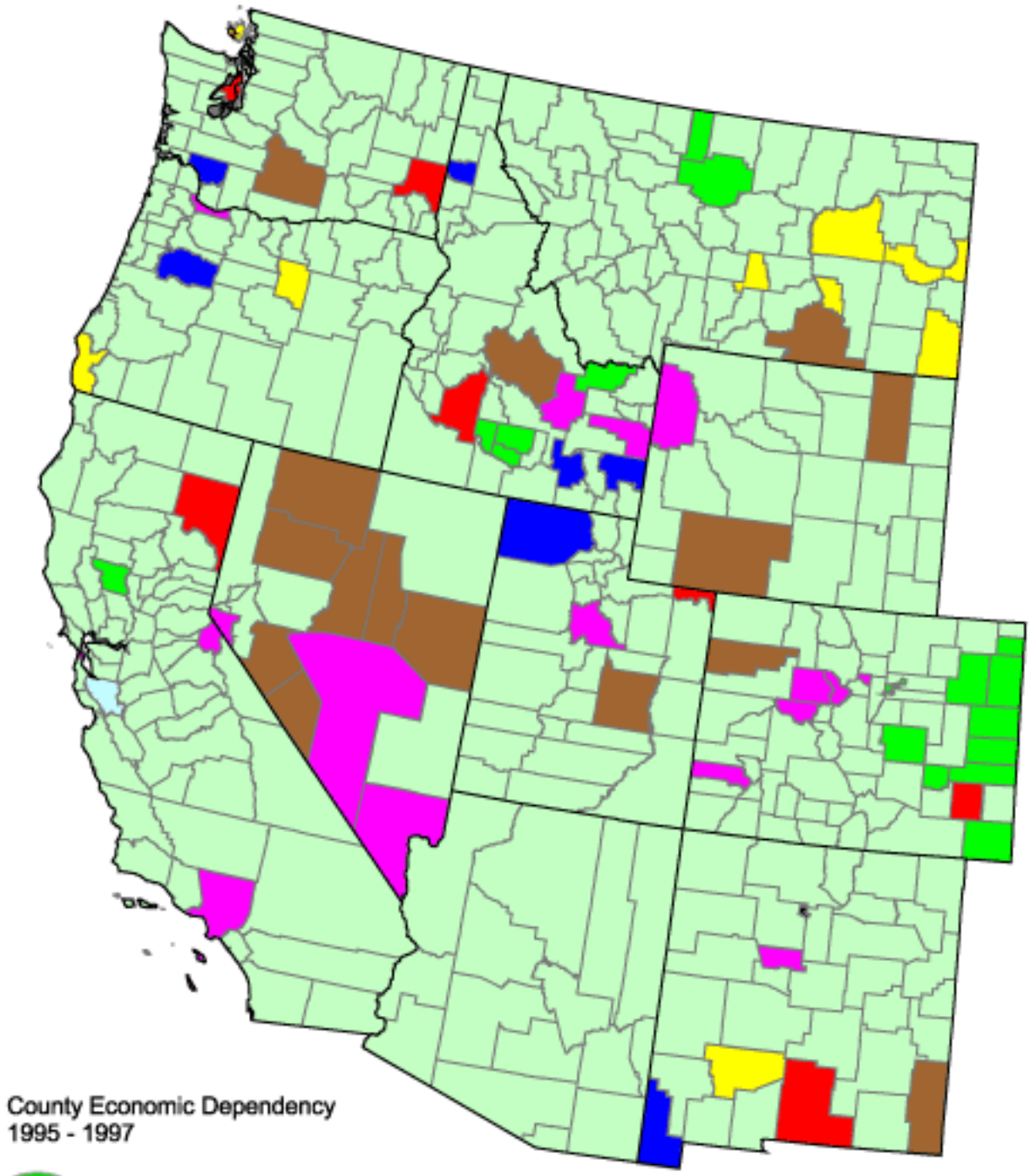
Key Findings: Most western counties are non-dependent, that is, they have diversified economies which are able to withstand single sector economic shocks. Of particular interest are those counties with large amounts of BLM land and economies that are dependent. Such counties are economically vulnerable because of their high degree of specialization. While economic indicators for these counties may appear robust, they lack the resiliency of more diversified economies to resist economic downturns. Historic examples of this include Denver's mineral dependency and consequent nearly decade-long recession in the early 1980s. Some of the potentially vulnerable areas include areas in southwestern Wyoming and west-central Nevada (mining dependent), south-central Idaho (farming and service dependent), and central Idaho and southeastern Nevada (service dependant).

Limitations: Data quality is very good. Additional statistical spatial analysis could be accomplished with additional time. Analysis, as presented in this document, could be updated yearly.

Source: Cook, Peggy J., and Mizer, Karen L., The revised ERS County Typology: An Overview, Rural Economy Division, Economic Research Service, United States Department of Agriculture (USDA), Rural Development Report 89, December 1989. Available from http://www.econ.ag.gov/epubs/other/topology. Additional analysis provided by Chuck Romaniello and Karla Rogers, BLM.

Comments: Economic Dependency was calculated by BLM economists inspired by a decade-old study done by the USDA Economic Research Service. Twelve economic sectors' income were examined: farming, mining, manufacturing, government, service, non-labor, agriculture, construction, transportation/public utilities, wholesale, retail, and fire. The last six sectors were dropped from further analysis because no counties were highly dependent upon them. To be considered dependent, a county had to meet established threshold values for a particular sector for all of the three years (1995 - 1997). The threshold value was determined by the percentage of the economic sector when compared to the whole economy. The threshold value was defined as any percentage falling at least two standard deviations above the mean for that particular sector.

Economic Dependency



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Grazing Revenue

Indicator: Grazing Revenue received in Fiscal Year 1999, by county. This indicator includes receipts collected for all grazing activity on BLM land. The values presented are sums of Fund 715 (Receipts, Grazing etc., Outside Grazing Districts), Fund 720 (Receipts, Grazing etc., Within Grazing Districts), and Fund 725 (Receipts, Grazing etc., Misc.). These funds are reported monthly by the office that collects the revenue, which can vary throughout BLM.

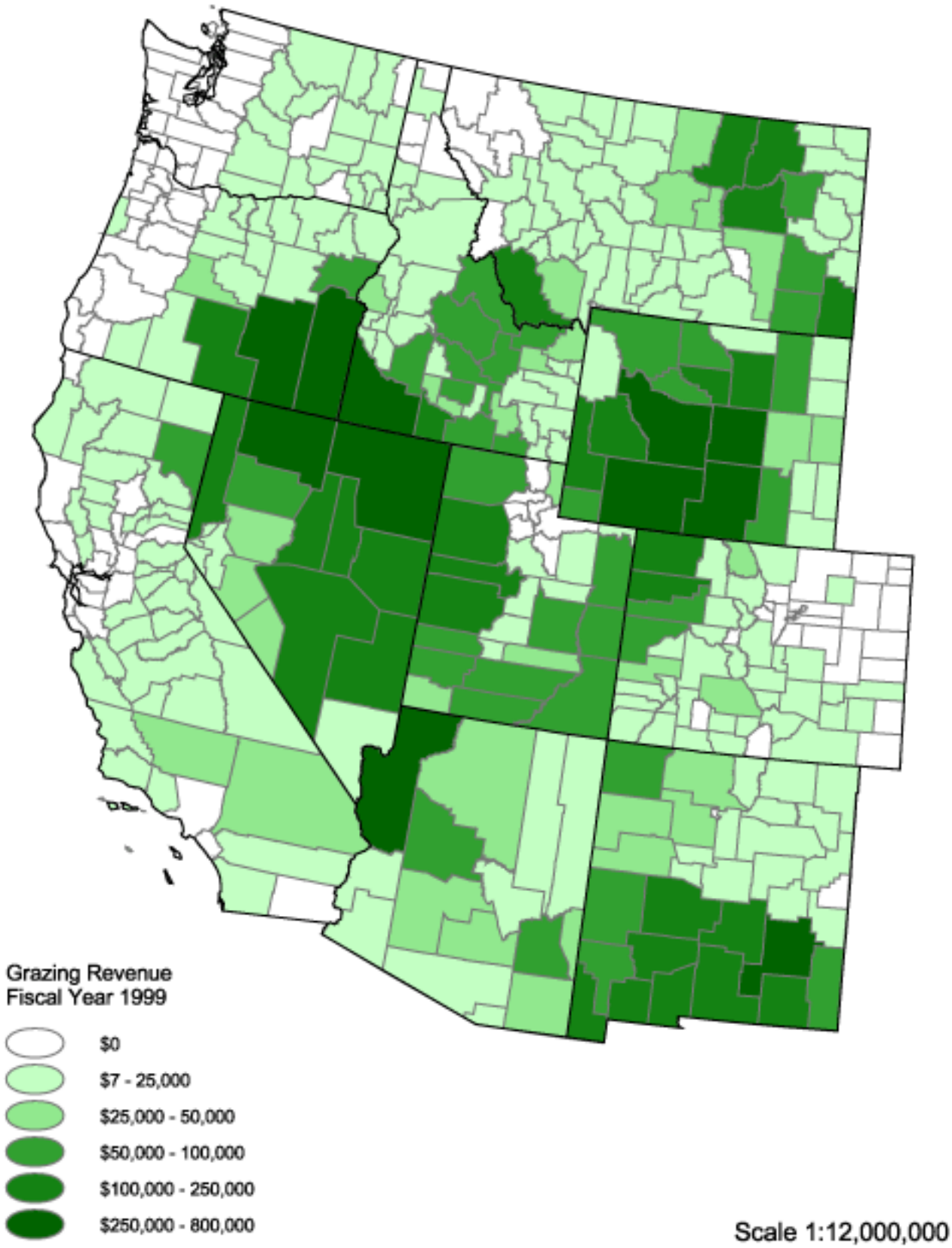
Key Findings: Grazing revenues are found to be highest in those counties with the highest concentrations of BLM land. Most notable are areas in northern Nevada, southeastern Oregon, southwestern Idaho, southwestern Wyoming, and southeastern New Mexico. These areas are characterized by relatively low population density and low per capita income. Interestingly, none of the high revenue areas coincide with farming dependent economies. While the BLM grazing program does not appear to be a big revenue generator, it does appear from this analysis to be important in areas that are very rural and generally not economically vibrant. Socioeconomic considerations in making land management decisions may prove to be crucial to the livelihood of people living in these areas.

Limitations: These data, based on 8100 and 8200 Range Improvement Funds, are considered to be very good, and can be readily updated. This analysis does not provide a good indicator of intensity of grazing on BLM lands and should not be viewed as such. This analysis requires a more accurate land status data layer to "normalize" the revenue for amount of BLM lands. This would provide a direct indicator of grazing intensity per acre of BLM land. Initial attempts to conduct such an analysis, using available land status data, proved highly inaccurate and misleading.

Source: Bureau of Land Management, National Business Center.

Comments: Grazing is a high-emphasis program on BLM lands. It can be viewed as both a consumptive use and a management tool. Negative impacts from improper management can include soil erosion, water quality degradation, reduced forage for wildlife, and increased invasive weed species. When used appropriately as a management tool, it can provide economic benefits to the human population while enhancing natural ecosystems. Most western ecosystems evolved with wildlife grazing. When carefully managed, cattle and sheep grazing can perform the same required evolutionary function.

Grazing Revenue



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Leasable Mineral Revenue

Indicator: Total revenue received by county for leasable minerals from all federal lands for fiscal year 1999. Leasable minerals include primarily coal, oil and gas and geothermal. Trona and potash mining on public lands and hard rock mining on acquired lands are also included and can be significant in some areas. Revenue includes bonuses from lease sales, annual rental payments, royalties, and other revenue such as settlement payments, recoupments, gas storage fees, and estimated payments. Royalties by far make up the majority of the revenue received from leasable minerals. This map includes revenue from both public and acquired minerals.

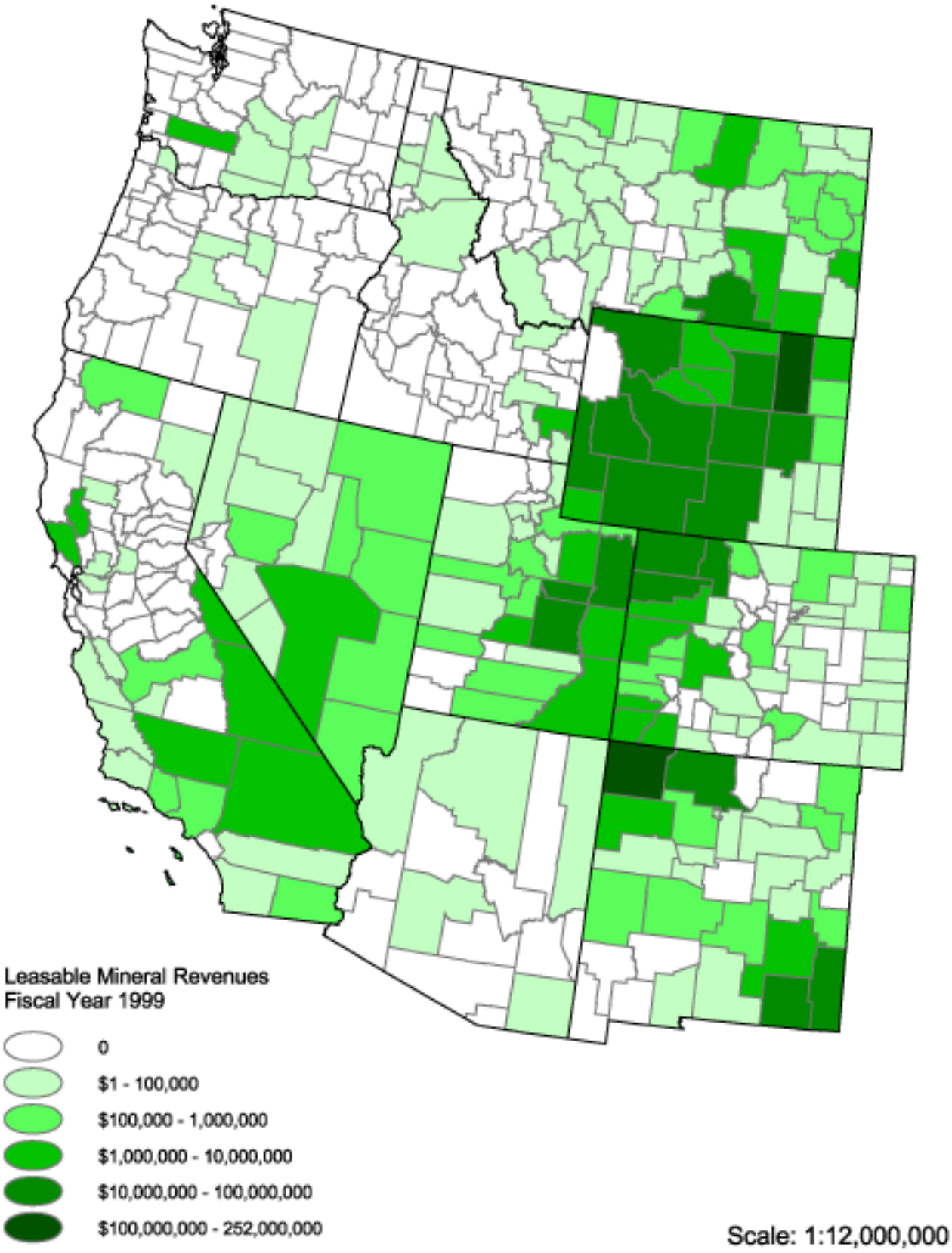
Key Findings: Leasable mineral revenues are by several magnitudes the major income producer for federal resources. The total received for the twelve western states for fiscal year 1999 equaled $980,914,987. Mineral revenues are an important indicator of economic activity in rural mining-dependent locations. Wages and income directly generated by mining related activity as well as indirect economic activity (economic activity dependent upon direct mining-related income) can be crucial in the economic health and historically the very existence of small rural communities. High levels of leasable mineral revenues are generated in counties across the entire spectrum of population density and per capita income. High revenues and economic dependency occur in a number of counties in northeast and southwest Wyoming, northwest and southeast New Mexico. Mineral dependent counties in both northwest and central Nevada, central Utah, south central Washington and southeast Montana are also areas of BLM concern.
Generally, half of the revenue received from leasable minerals on federal onshore public lands is disbursed to the State where it originated, and, for acquired minerals, generally one-quarter is disbursed to States. This creates a high level of interest from State governments in maintaining the development potential of the federal minerals, particularly in States with high percentages of productive federal mineral ownership like Wyoming, Utah and New Mexico.

Limitations: The BLM also collects additional revenue from filing fees, non-compliance assessments, and administrative charges, but these are negligible compared to the total, not easily separable into county of origin and are not included. Onshore revenue of $13,583,452 could not be separated into county of origin so is not on the map. Revenue from Native American minerals is not a federal resource so is not included. The data is not differentiated by surface ownership (e.g., BLM, private surface, National Forest System lands.) The analysis would be made more useful if leasable mineral revenue could be normalized by a digitized and accurate data layer of the BLM-managed mineral estate, which does not currently exist. An estimate of this kind would provide an indicator of mineral revenue per BLM sub-surface acre, a potentially useful socioeconomic indicator of economic activity.

Source: Minerals Management Service (MMS): http://www.rmp.mms.gov/Stats/fmrd.htm. While the BLM collects a portion of this total, MMS data accurately reflects the BLM collections for bonuses and first year rentals. Data is good and is updated annually.

Comments: None

Leasable Mineral Revenues



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Per Capita Income

Indicator: 1997 estimated per capita income by census tract. Per capita income is calculated by normalizing an area's income by its population. The resulting values may be used as a coarse comparison of the economic well-being of people living in different areas. Census tracts are small, relatively permanent geographic entities within counties. Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow visible features. This information is portrayed using colors to indicate standard deviations from the mean.

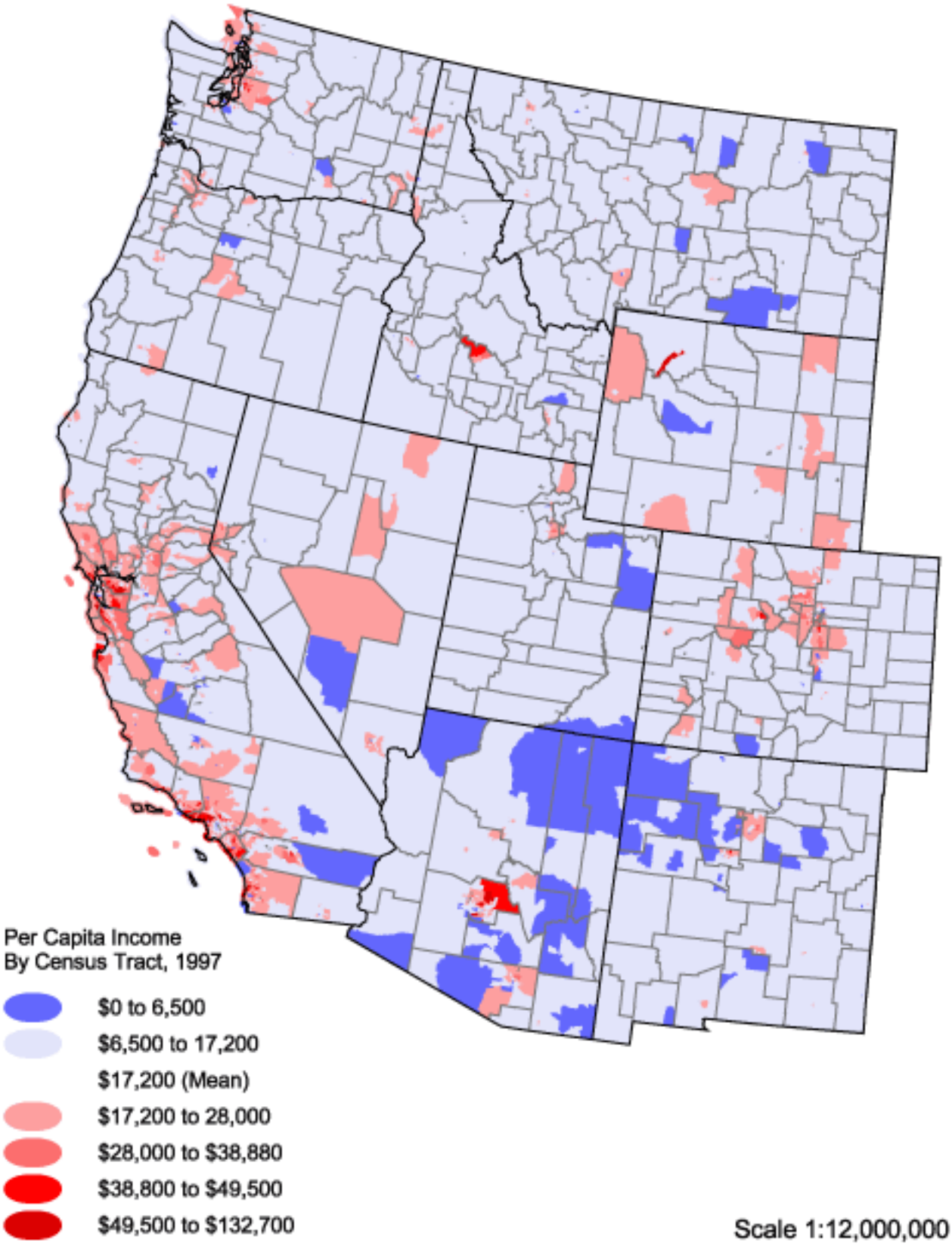
Key Findings: Per capita income compared with land status maps indicate where severe poverty or significant wealth and BLM lands coincide. BLM lands generally are not located in areas with either very high or very low per capita income. This generalization is not true in northwestern Arizona where high concentrations of BLM land and very low income do coincide. Under circumstances such as these, management of the land may require a heightened sensitivity to economic needs of the people and environmental justice. Conversely areas of high per capita income may require a considerably different focus and a different set of communication tools.

Limitations: These data are considered to be of very good quality and are easily obtainable. This information provides a general picture of an area's overall wealth. It is not sufficient information to fully depict an area's economic character or vitality.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census, available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu, City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html or in the library reference section.

Comments: This statistic is based on the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Per Capita Income



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Population Density

Indicator: Population density (number of people per square mile) in 1997, mapped by census tract. Population density is calculated by normalizing an area's population by its geographic extent (in square miles). Census tracts are small, relatively permanent geographic entities within counties. Generally, they have between 2,500 and 8,000 residents and boundaries that follow visible features.

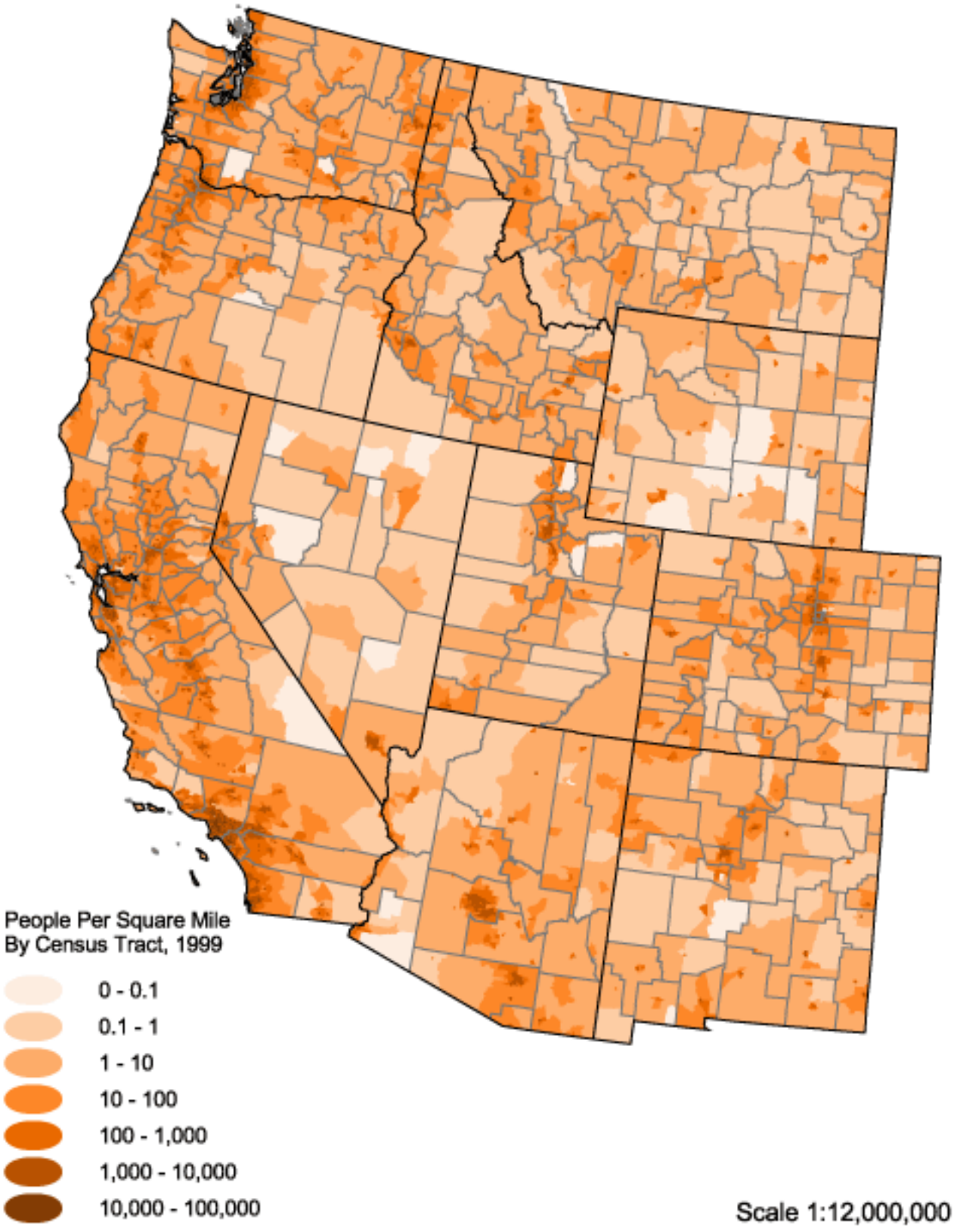
Key Findings: BLM lands are almost exclusively located in areas of low population density. Such conditions can provide opportunities for wildlife, recreation, and consumptive use not generally possible in more populated areas. There are exceptions, however, that offer opportunities of their own. For example, in northeastern Utah, watershed units with 60-80 percent BLM land lie adjacent to areas of high population density. Under such circumstances, BLM lands may be especially important for recreation, as a haven for special status species, or simply for the esthetic value. As such, higher population concentrations may reflect a higher potential for conflicts among uses.

Limitations: These data are considered to be of very good quality and are easily obtainable on an annual basis. In isolation, this information provides a general picture of the intensity of human settlement. Many analyses are possible with this information.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census: available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu. City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html or in the library reference section.

Comments: This information comes from the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Population Density



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Population Density Change

Indicator: Change in population density per square mile from 1989 to 1997, by census tract. Population density change is calculated by subtracting an area's population in 1997 from that in 1989 and normalizing by geographic extent (square miles). Census tracts are small, relatively permanent geographic entities within counties. Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow visible features.

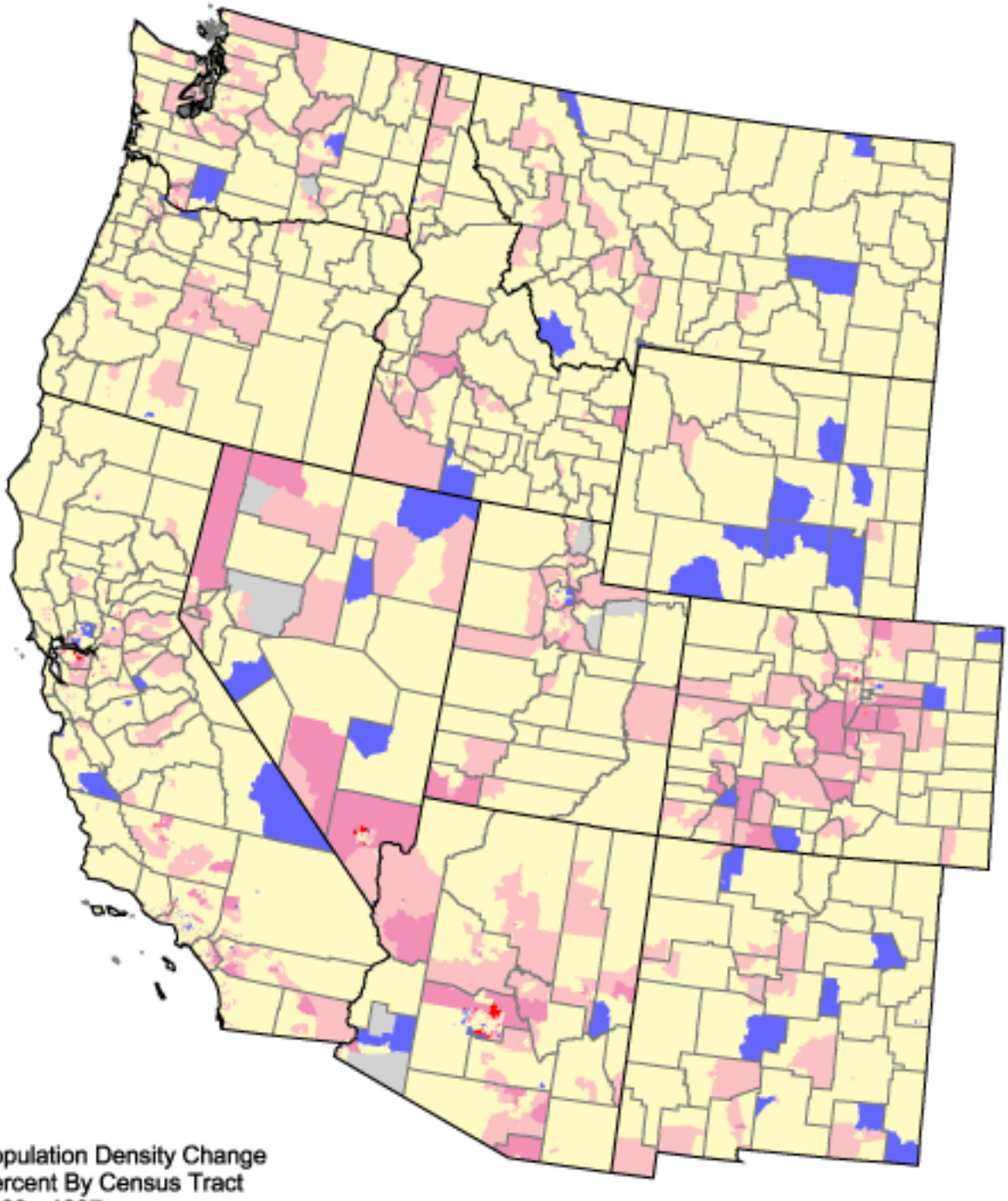
Key Findings: This information provides a general picture of the changing intensity of human settlement. In general, BLM lands are seldom concentrated in the areas of fastest growth. Population density change compared with per capita income provides an indicator of the economic health of an area. Generally, areas with low per capita income and decreasing population density are considered economically unhealthy and would benefit from financial stimulus. One area of possible concern is located on the western border of Nevada where high concentrations of BLM lands do exist in the vicinity of lands with relatively high population growth as well as lands showing population loss. Another lies on the southeastern border of California where negative population growth exists. Only one area, southwestern Nevada, appears to show a high concentration of BLM lands in conjunction with negative population growth and very low per capita income. Areas of relatively high population growth may offer exceptional economic or aesthetic opportunities. Areas of negative growth, which include many rural areas throughout the west, may require special sensitivity to the needs of the people in the local communities.

Limitations: These data are considered to be of very good quality and are easily obtainable. Many additional analyses are possible with this information.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census, available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu. City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html, or in the library reference section.

Comments: This information comes from the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Population Density Change



Population Density Change
Percent By Census Tract
1989 - 1997

- -1.5% to -0.2 (2 Std. Dev.)
- -0.2% to 0.2 (1 Std. Dev.)
- 0.2% (Mean)
- 0.2% to 0.5 (1 Std. Dev.)
- 0.5% to 2 (2 Std. Dev.)
- 2% to 2.5 (3 Std. Dev.)
- 2.5% to 44.5 (4 Std. Dev.)
- No Data

Scale 1:12,000,000

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Congressional Districts

Indicator: Congressional districts of the United States for the 106th Congress. Congressional districts are apportioned by the number of residents.

Key Findings: There are 91 congressional districts in the eleven western states. Most are concentrated in and around large metropolitan areas. Those areas with the most BLM land are generally also the most sparsely populated and therefore support the largest congressional districts. Wyoming and Montana have only one district each, Idaho and Nevada have two each, and Utah and New Mexico have three each. Las Vegas, Nevada, offers a contrast in that the metropolitan area constitutes an isolated district. The small amount of BLM land included in this congressional district is of particularly high value to development interests. In addition, recreational demand by Las Vegas residents highly impacts the surrounding district.

Source: National Atlas of the United States of America: http://www.nationalatlas.gov/atlasftp.html

Limitations: None

Comments: None

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BLM Land within Subbasins - Alaska

Indicator: Percentage of BLM-administered surface acreage within subbasins. A subbasin (also referred to as a cataloging unit or an 8-digit hydrologic unit code (HUC)) is an intermediate-sized drainage area within the widely accepted United States Geological Survey hierarchical system of hydrologic units. It is an integral unit in the Interior Columbia Basin assessment and subsequent management strategies as well as Unified Watershed Assessments conducted under the Clean Water Action Plan. In addition, the subbasin is used by the Environmental Protection Agency to summarize water quality ratings across the nation. The subbasin is used throughout this prototype whenever appropriate data is available.

Key Findings: There are 135 subbasins in Alaska. Of that total, 29 have at least twenty percent BLM land. The table below shows the actual number of subbasins with specified amounts of BLM-administered surface acreage.

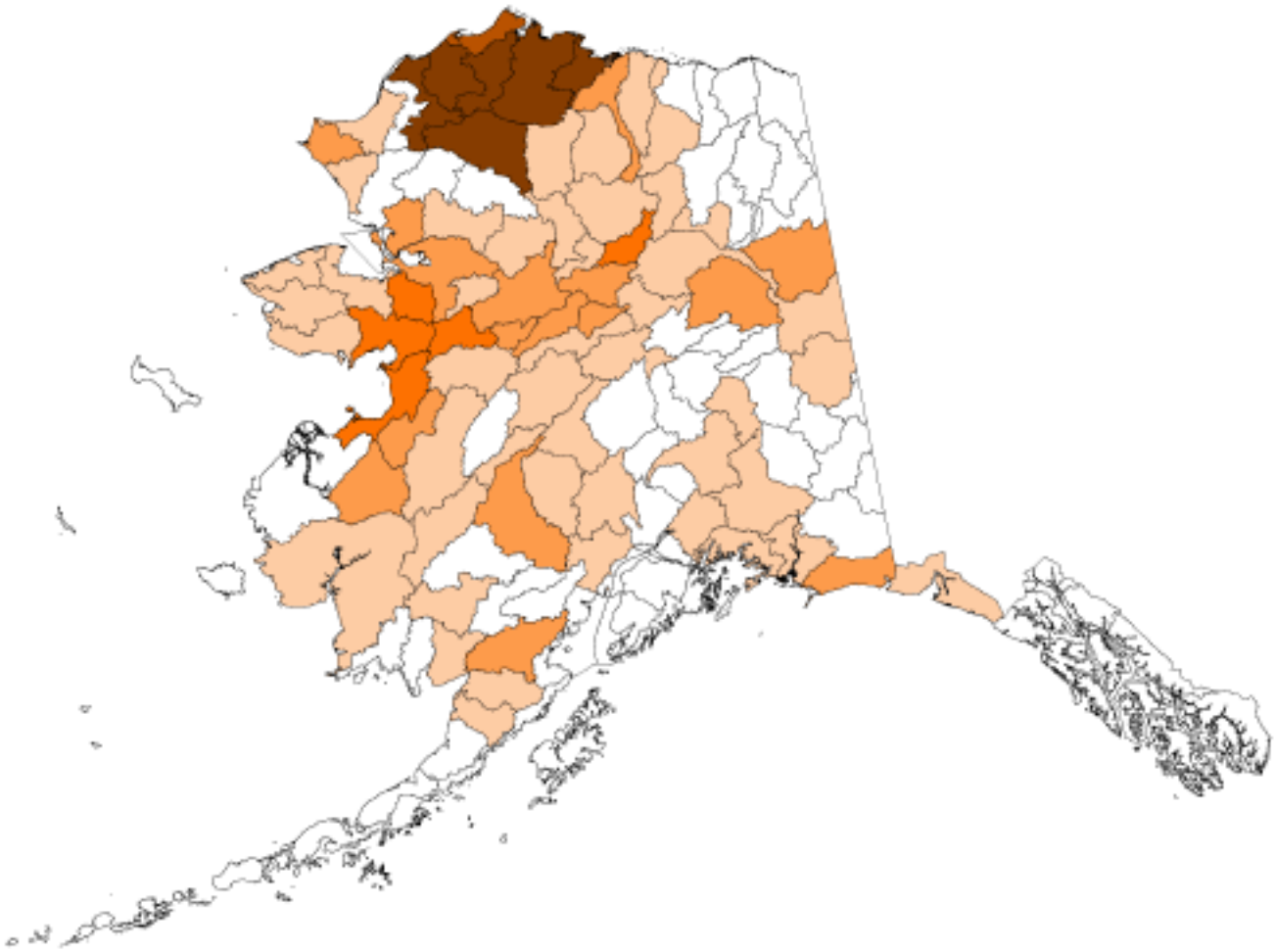
% BLM land	Number of Subbasins
> 80	6
60 - 79	1
40 - 59	6
20 - 39	16
1 - 19	45

Limitations: Subbasin boundaries are available from various sources which can often result in slightly different map delineations. At this scale, however, such differences are probably insignificant.

Source: National Atlas of the United States, Federal and Indian Lands theme and Hydrologic Unit Boundaries theme: http://www.nationalatlas.gov/atlasftp.html.

Comments: None

BLM Lands within Subbasins



Percent of Subbasin that is BLM Surface

- 0 - .9 %
- 1 - 19 %
- 20 - 39 %
- 40 - 59 %
- 60 - 79 %
- 80 - 100 %

Scale 1:15,000,000

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BLM Surface Parcel Size

Indicator: Average size of contiguous blocks of BLM-administered surface by subbasin. A subbasin (also referred to as a cataloging unit or an 8-digit hydrologic unit code (HUC)) is an intermediate-sized drainage area within the widely accepted United States Geological Survey hierarchical system of hydrologic units. Average block size is expressed as sections or townships and multiples thereof. One section equals 640 acres and one township contains 36 sections.

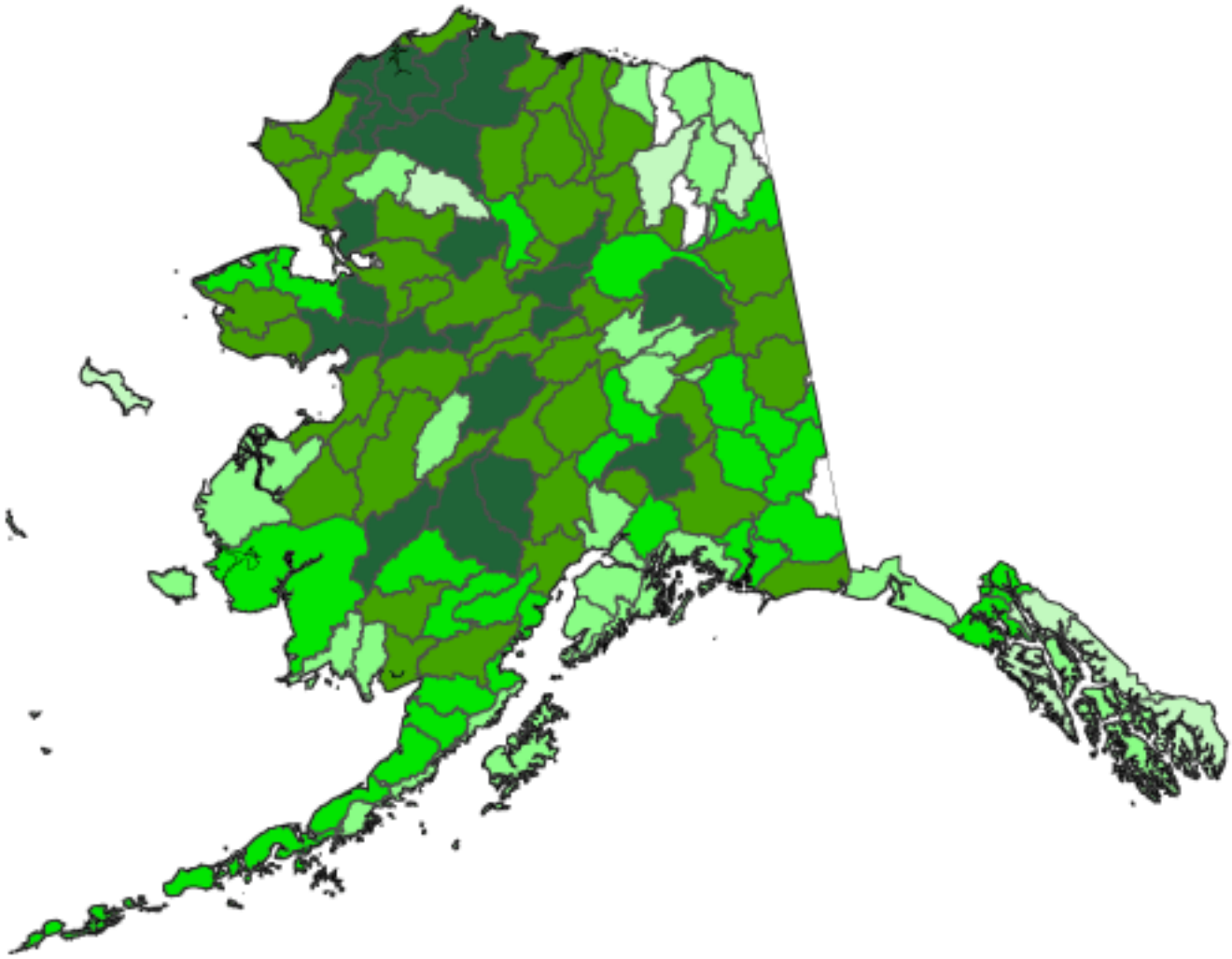
Key Findings: While there is certainly a positive correlation between the amount of BLM land and the average parcel size, careful comparison of this map with the "BLM Lands within Subbasins" map reveals differences as well. Subbasins with the highest amount of BLM land do not necessarily show the largest average parcel size. A subbasin in western Colorado and another in eastern Alaska show less than 40 percent total BLM land with an average parcel size of greater than five townships.

Limitations: This map shows contiguous blocks of surface ownership. It does not show potential fragmentation of the surface that may be caused by uses within each block (e.g., roads, fences, etc.)

Source: National Atlas of the United States, Federal and Indian Lands theme and Hydrologic Unit Boundaries theme: http://www.nationalatlas.gov/atlasftp.html.

Comments: Average surface parcel size may present opportunities for management. For example, larger parcel size may present us with greater management flexibility. In areas where BLM manages small parcels, the need for partnerships with neighboring landowners may be critical to accomplishing management objectives.

BLM Surface Parcel Size



Mean BLM Surface Parcel Size

- < 1 Section
- > 1 Section and < 5 Sections
- > 5 Sections and < 1 Township
- > 1 Township and < 5 Townships
- > 5 Townships

1:15,000,000

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Vegetation Assemblages - Alaska

Indicator: General vegetation landcover identified by satellite inventory. Vegetation assemblages are plant communities, shown here grouped by categories of most interest to BLM lands.

Key Findings: Vegetation characterization at this level of detail is a basic descriptor rather than an indicator. Alaska BLM contains more forested lands than the BLM lands in the west.

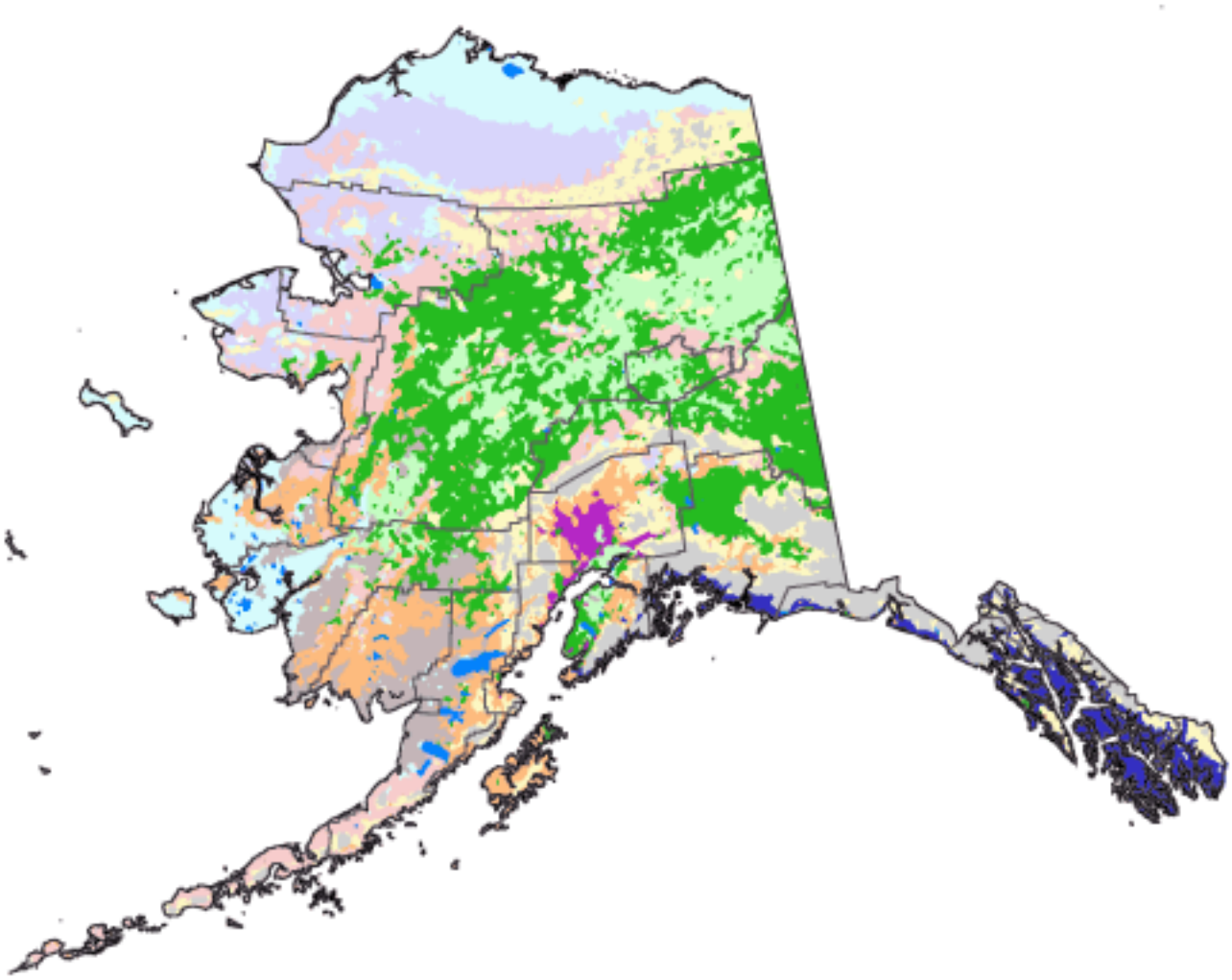
Limitations: It can serve as a communication tool to aid in understanding the nature of the public lands. Beyond that, it is of limited use for land management purposes without meaningful indicators of vegetation condition. The data were originally presented in a greater number of categories, which were reduced to those shown. Note that the vegetation assemblages are presented in different categories than for the western United States.

Source: United States Geological Survey, Anchorage, Alaska; available from the Alaska GeoSpatial Data Clearinghouse: http://agdc.usgs.gov. This map presents this data smoothed using a 10x10 cell window.

Comments: The BLM generally lacks vegetation information to form a suitable baseline for monitoring the effectiveness of management actions. Several BLM states and field offices, as well as other agencies, have generated vegetation classifications and maps from satellite imagery (e.g., Advanced Very High Resolution Radiometer (AVHRR), Landsat). Alaska BLM has established a statewide protocol through the Alaska Geographic Data Committee, for an ongoing effort to gather suitably accurate data using Landsat imagery. However, over the rest of the Bureau, such efforts have not been well coordinated, and resultant maps are generally not compatible. Other types of BLM vegetation data (for example, ecological site inventories) are not consistent among field offices, provide incomplete coverage, and are often not in a form that permits spatial display and analysis.

Since vegetation is so important in determining the condition of the land, the BLM should re-evaluate its current approach(es) and invest in a new strategy. The goal should be to generate or acquire vegetation data that is: (1) consistent across (at least) regional biophysical units and ownership patterns; (2) detailed enough to provide meaningful indicators of condition; and, (3) sufficiently economical to allow the process to be repeated periodically to document trends. To reach this goal will require interagency cooperation, recognition of existing standards (i.e., Federal Geographic Data Committee National Vegetation Classification Standard,) and a willingness to compromise to achieve a workable level of consistency.

Vegetation Assemblages



General Landcover

- Glaciers and Snow
- Water
- Hardwood Forest
- Mixed Forest
- Spruce Forest
- Other Needleleaf Forest
- Tall Shrub
- Low Shrub / Lichen Tundra
- Dwarf, Low, Tall Shrub
- Tussock Sedge / Dwarf Shr
- Wet Tundra
- Alpine Tundra or Barren

Scale 1 : 15,000,000

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Cultural Sites- Alaska

Indicator: Number of cultural resources sites recorded by subbasin. This indicator shows where the greatest concentrations of cultural resources are currently known to be located.

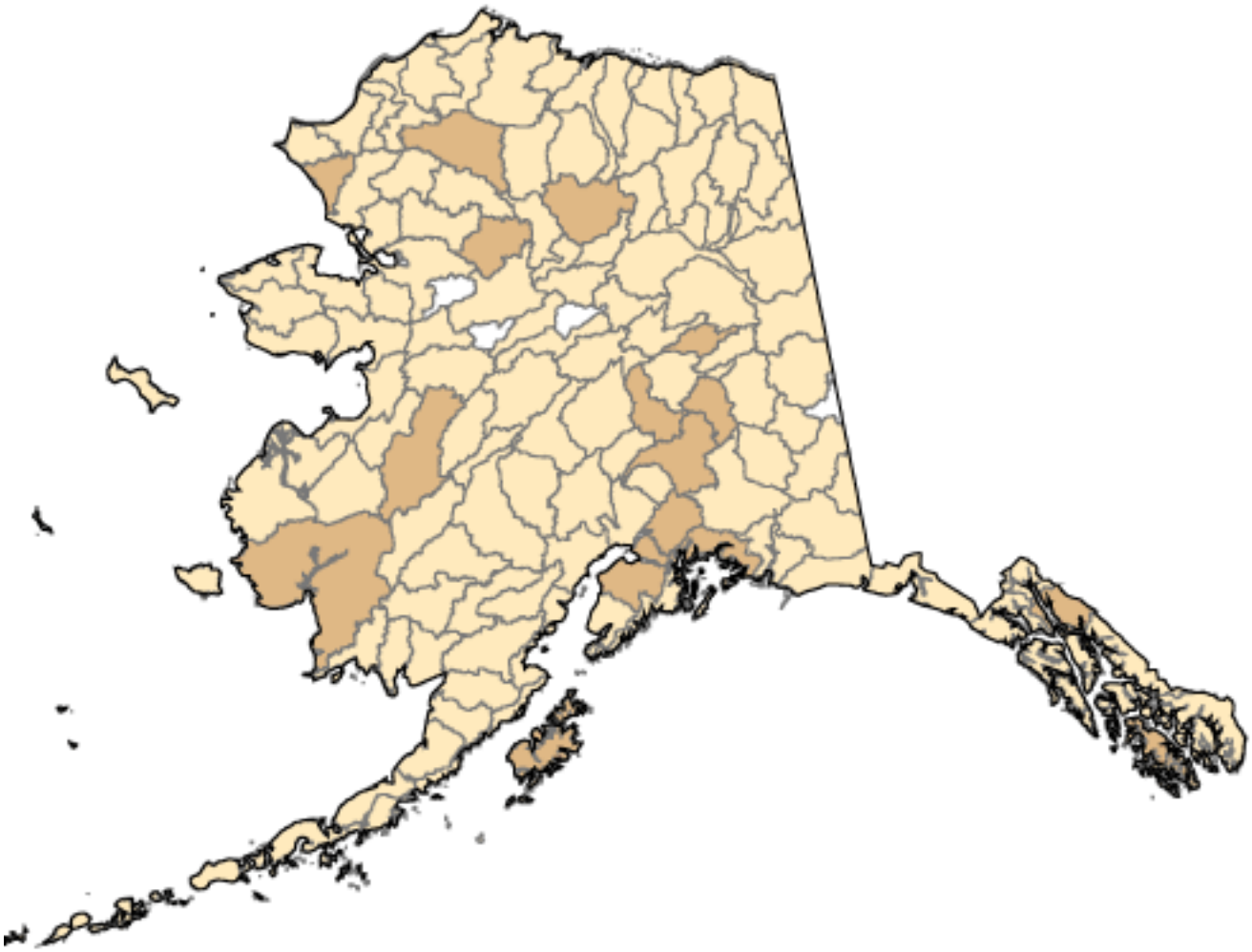
Key Findings: Compared to the lower 48, Alaska has relatively few recorded sites. Most are in the vicinity of Anchorage or within national parks, national monuments, or national wildlife refuges.

Limitations: The quality of the data is very good and specific site locations are in Alaska's automated database. This is not an indicator of how many total sites are in any given subbasin, as random sampling and predictive modeling have not been done in Alaska. The number of sites has not been normalized.

Source: The Alaska Division of Parks, Office of History and Archaeology (the State Historic Peservation Office) provided the BLM with a table listing each recorded Alaskan site and its location in latitude/longitude. The Bureau is currently helping to automate Alaska's cultural resources inventories.

Comments: Systematic non-judgmental surveys are rarely conducted in Alaska. Until this changes, it will be difficult to determine or even predict the actual distribution and density of cultural resources in Alaska.

Cultural Sites



Total Sites Inventoried

- 0
- 1 - 250
- 250 - 1000
- 1000 - 2000
- 2000 - 5000
- 5000 - 15000

Scale 1:15,000,000

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Air Quality - Alaska

Indicator: Nonattainment Areas (areas with significant existing levels of air pollution) and Class I Areas (clean areas where almost any additional air pollution would be considered significant) by boroughs. Boroughs are presented as "in attainment" (i.e., the entire area is within all applicable standards), "partially in attainment" (i.e., a portion of the area has been demonstrated to violate at least one applicable standard), or "entirely in nonattainment" (i.e., the entire area has been demonstrated to violate at least one applicable standard). Class I Area boundaries are presented as established either by Congress or tribal governments.

Key Findings: Although the Bureau has not had significant air quality issues in Alaska, the potential exists for nonattainment issues in the Anchorage and Fairbanks regions. There is also potential for air quality impacts to the Denali National Park and Tuxedni Wilderness Class I Areas.

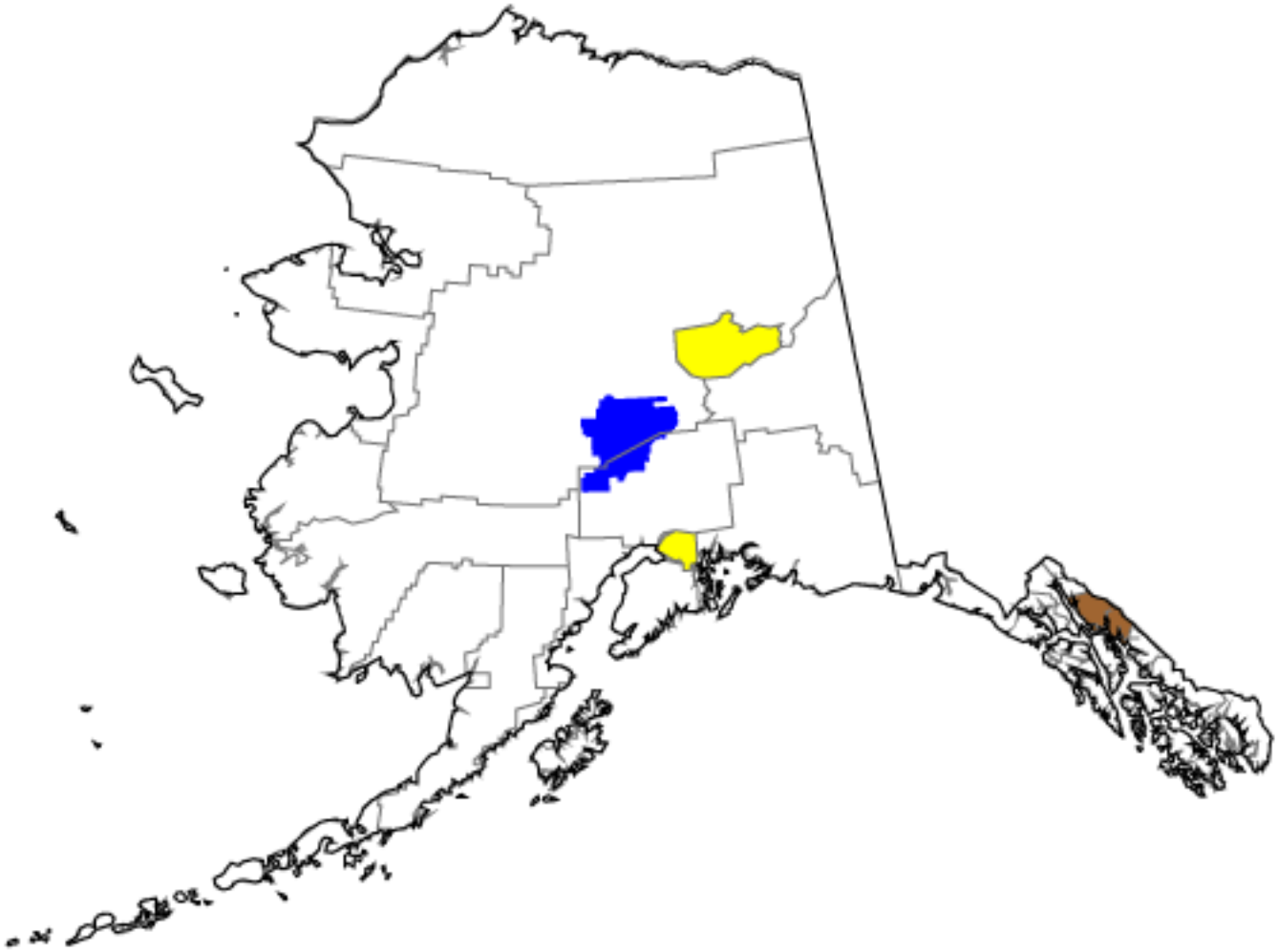
Limitations: Environmental Protection Agency (EPA) revises nonattainment area boundaries regularly, but given periodic changes in the standards and the non-automated form of the record, generating meaningful trends is unlikely. Class I Area data were assembled from several different sources, with National Park Service (NPS) caveats regarding data accuracy. In addition, several Class I Areas are too small to be seen on broad scale maps.

Source: The nonattainment area data and maps were obtained from the EPA website: http://www.epa.gov/agweb/nonat.html; Class I Area data were obtained from the NPS website: http://www2.nature.nps.gov/ard/parkhp.html.

Comments: The air quality status on and near the public lands is significant because the Bureau must: (1) conduct a regulatory Conformity Analysis and Determination within designated nonattainment areas prior to implementing actions, (2) comply with applicable Class I Area air pollutant limits, and (3) may need to determine if activities would cause significant visibility impacts. Activities that impact either nonattainment or Class I areas are likely to cause public concern and require additional National Environmental Policy Act analysis. All activities conducted within EPA designated nonattainment areas are subject to regulatory air pollutant emissions limitations. There are currently ten different standards for six different pollutants, with two additional standards under review. The total additional amount of nitrogen dioxide, particulate matter, and sulfur dioxide is also limited within Class I Areas. All Bureau authorized or conducted activities must comply with these requirements (40 CFR 51.850 and 43 CFR 2801.2(b)(2)).

The single map showing all boroughs with even partial nonattainment status for any applicable air pollutant could be replaced with multiple maps for individual air pollutants, and the precise boundaries could be digitized. The Bureau could also generate higher quality individual Class I area maps. However, it is unlikely that more specific or precise maps would justify the labor and financial requirements necessary to refine and digitize these large scale maps.

Air Quality



County Attainment Status

Partially in Nonattainment
Due to:

Carbon Monoxide

PM10

Air Quality Class I Areas

Scale 1:15,000,000

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Special Status Species – Alaska

Indicator: Number of species federally listed as threatened or endangered, including proposed and candidate species, on both public and private lands, by borough. The BLM addresses the conservation and protection of plants and animals that are federally listed, proposed, or candidates for listing as threatened and endangered. The BLM also includes species designated as BLM sensitive in the category of special status species. BLM sensitive species (not included on this map) includes plants and animals warranting conservation action because of their declining abundance or occurrence, vulnerability to human-related activities, or other associated problems.

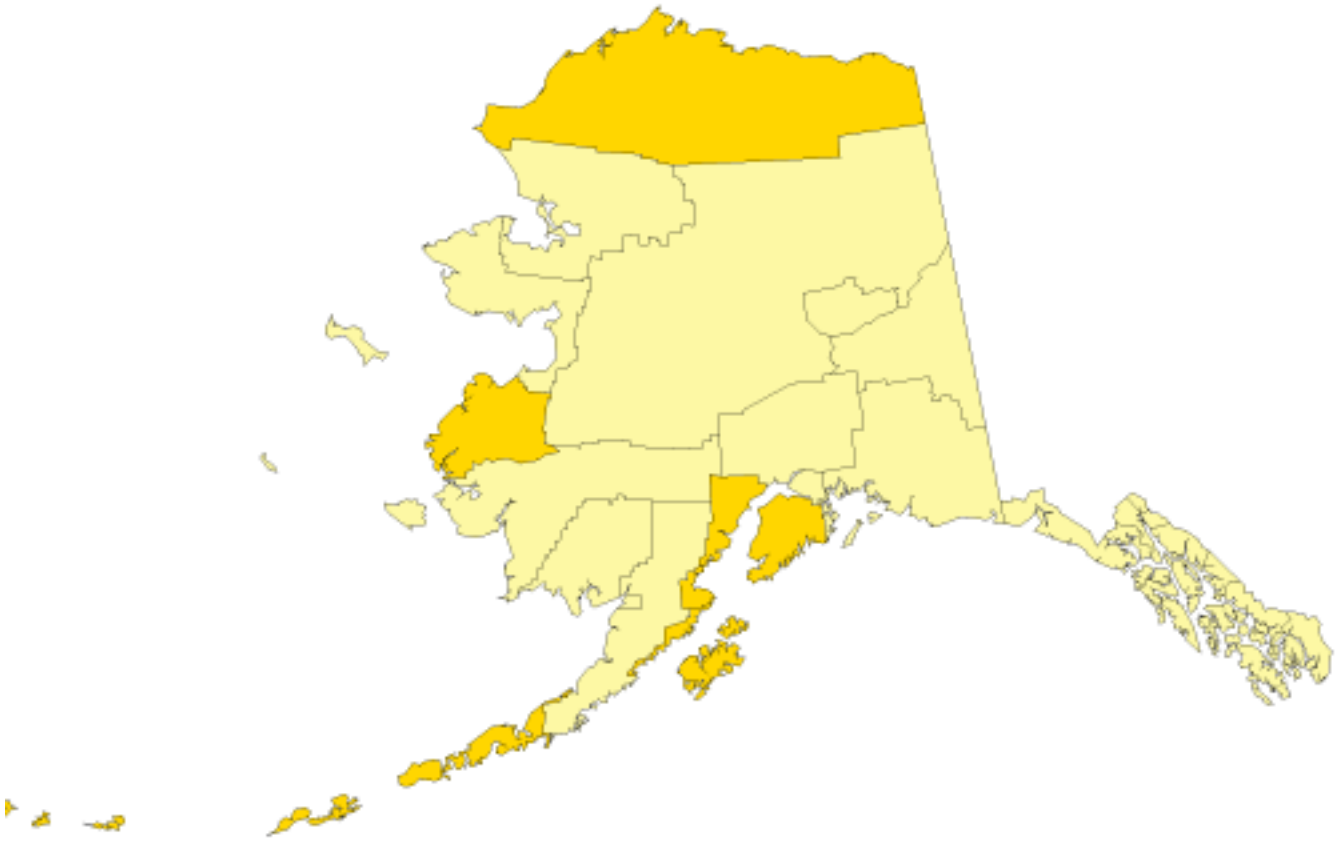
Key Findings: Public lands managed by the BLM support 228 species of plants and animals federally listed as threatened or endangered, 68 species proposed for listing, and 71 that are candidates for listing. Although not shown on the map, an additional 1500 species are designated as BLM sensitive. The map highlights those areas that contain relatively high numbers of listed, proposed, and candidate species, which may suggest unhealthy habitats. Further investigations are needed to determine causal factors and thus better guide management decisions.

Limitations: In some areas, the numbers of species alone will have little meaning. Because of large differences in borough size, a borough map is of limited use to show the relative distribution of special status species over the landscape. Species that appear in the same county may likely require different habitats. Furthermore, a borough map cannot adequately distinguish those species with distributions that overlap many boroughs from those that appear in relatively small areas. Because site specific data for BLM lands are lacking, the best source for this information was external and did not differentiate between species occurring on and off BLM-managed lands. In addition, the data portrayed are incomplete as the 1500 BLM sensitive species are not included.

Source: This information is excerpted from Stein, B.A., Kutner, L.S., and Adams, J.S eds. 2000. *Precious Heritage: The Status of Biodiversity in the United States.* Oxford University Press, New York., with permission granted by The Nature Conservancy (http://www.tnc.org) and the Association for Biodiversity Information (http://www.abi.org).

Comments: The Association for Biodiversity Information will be able to provide more detail on BLM specific species in the future. Also, BLM's long term strategic goal is to develop baseline information for 40 federally listed/proposed and twenty BLM sensitive species each year for the next five years.

Special Status Species



Threatened and Endangered Species
also includes Proposed and Candidate
1997

1

2 - 4

1:15,000,000

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Potential Fire Occurrence - Alaska

Indicator: Potential Fire Occurrence. This map shows the relative frequency of fire in Alaska based on: (1) the annual number of fires documented within each ecoregion, (2) fuel type based on vegetation assemblage, (3) an index to fire behavior within each fuel type, and (4) the average annual summer precipitation.

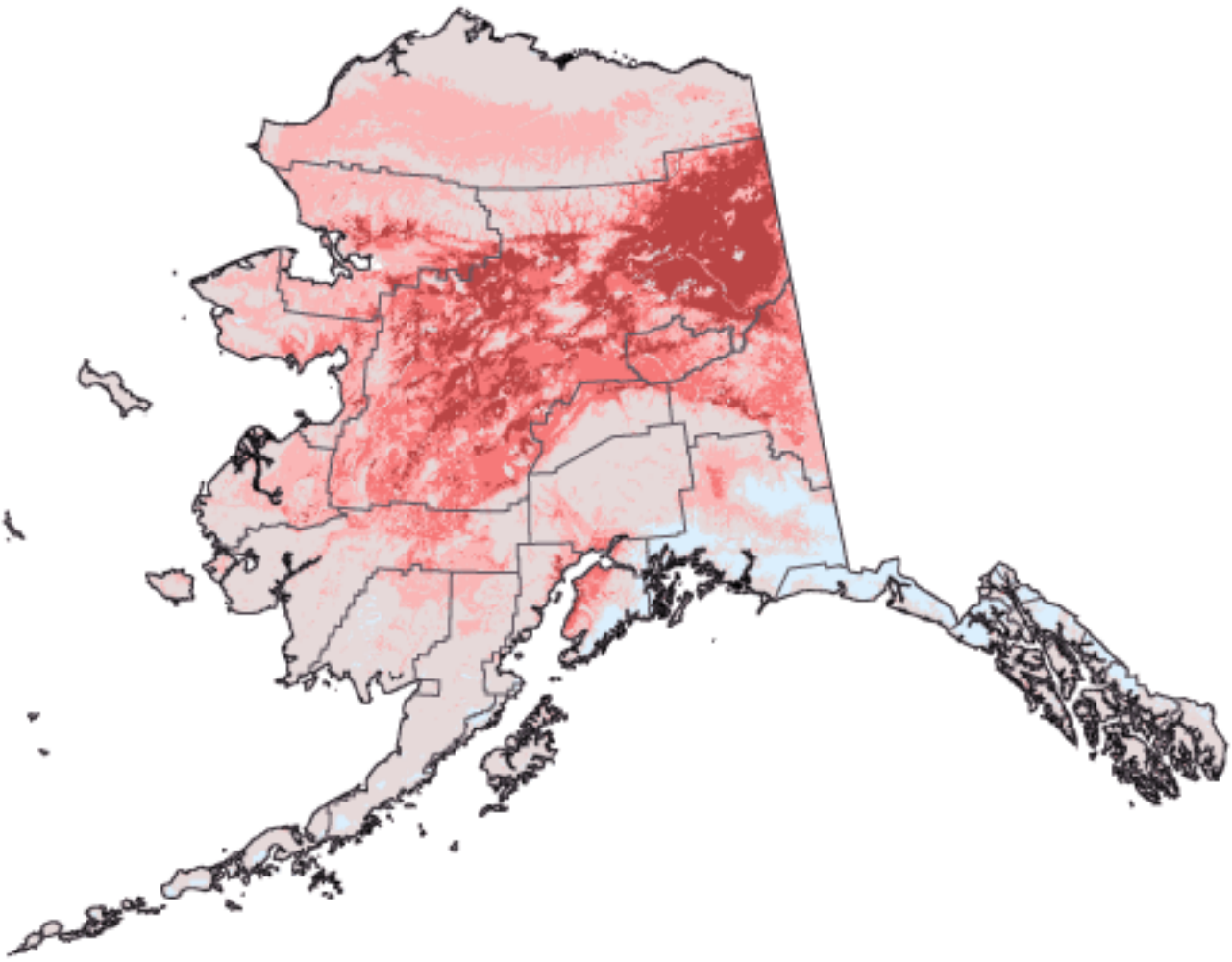
Key Findings: This map is a gross indicator and, as such, depicts where fire potential is highest. This map does not indicate the risk with respect to potential loss of ecosystem components due to the current condition of the land and its modified fire regime as defined by the U.S. Forest Service (Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station).

Limitations: This map is a combination of information from four different sources and has been smoothed to improve readability. At the scale of this map, a change in frequency would not be apparent until approximately one million acres were involved. In Alaska, the major ignition source is lightning, thus summer weather pattern dictates fire occurrence. Human caused ignitions, though increasing in frequency, are usually contained quickly and held to small areas of disturbance.

Source: *Ecoregion fire frequency:* Gallant, A. L., E. F. Binnian, J. M. Omernik, and M. B. Shasby, 1995. Ecoregions of Alaska. U.S. Geological Survey Professional Paper 1567. *Fuel type:* AVHRR/NDVI data provided by the U.S. Geological Survey, Anchorage, Alaska. *Fire behavior:* Canadian Fire Fuels Danger Rating System index to fire behavior provided by the Alaska Fire Service, Fairbanks, Alaska. *Precipitation:* May, June, July, and August average precipitation data were produced by UC Berkeley and the USGS using NCDC Global Historical Climatological Network data.

Comments: When this map is compared with the lower-48 (Fire Frequency and Land Condition), it is evident that Alaska systems have not been severely modified by a long history of fire suppression. In fact, Gabriel and Tande (*A Regional Approach to Fire History in Alaska)* indicated lightning caused fires have cycles ranging from 29 to 400 years.

Potential Fire Occurrence



Potential Fire Occurrence based on
Ecoregion, Fuel Type, Fire Behavior Index,
and Average Summer Precipitation

- Infrequent
- Common
- Very Common
- Frequent
- Rock / Water / Ice

Scale 1 : 15,000,000

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Special Recreation Permits

Indicator: Special Recreation Permits (SRPs) active during Fiscal Year 1999 by BLM field office. SRPs are issued for commercial, competitive, organized group activities and events, and special area events. These are recreation activities that occur on the public lands such as river rafting, outfitters and guides (including hunting, fishing and ecotourism) organized bike racing, and off-highway vehicle (OHV) events. This map does not show permits issued for individual non-commercial use.

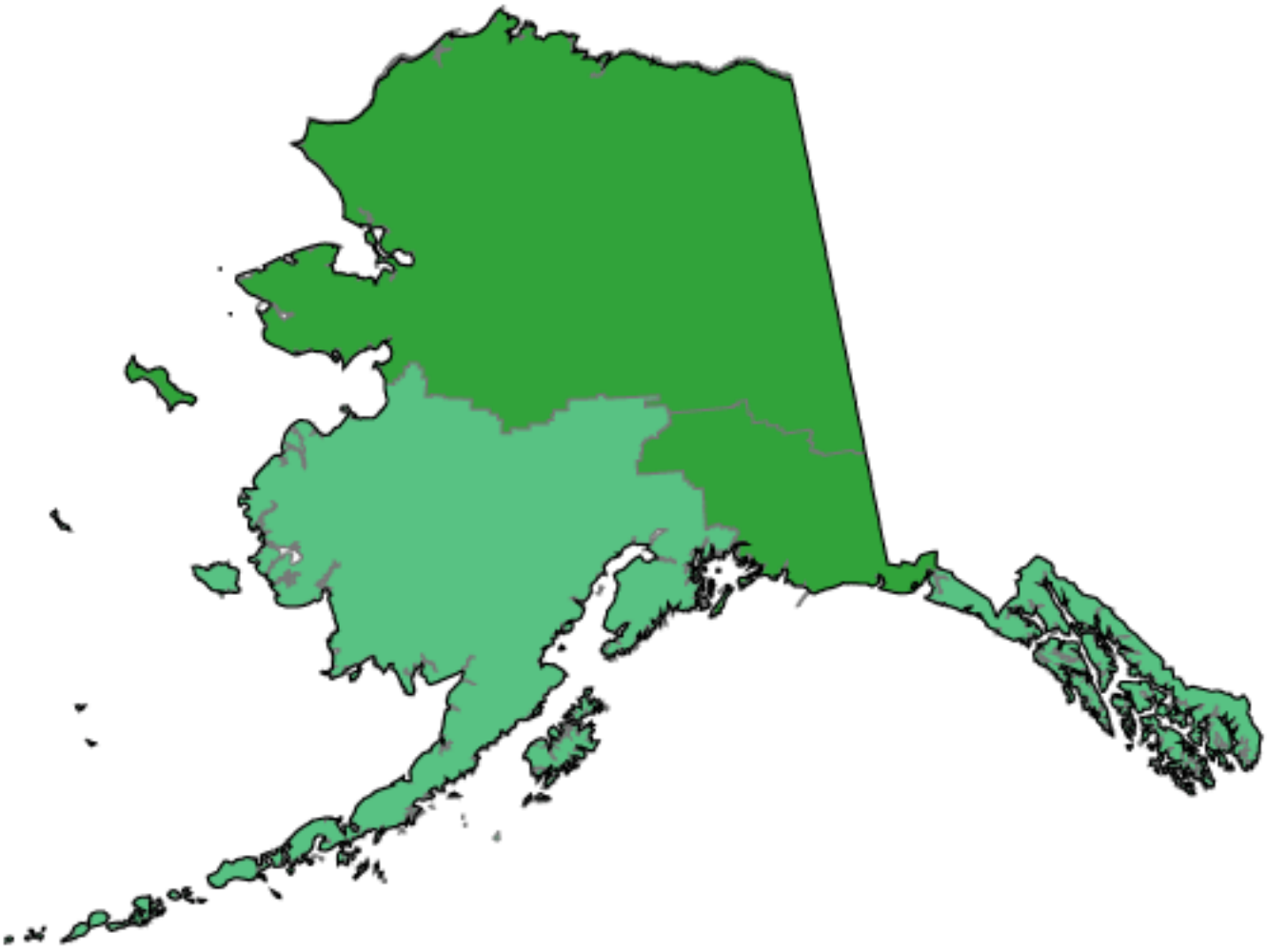
Key Findings: This is a direct measure of permitted recreation use. This is also an indirect indicator of the total recreational use of the public lands, most of which does not require a permit. However, where rivers are at carrying capacity (as established by plan), for example, there can be no more rafting permits issued. Some of the areas with the largest number of SRPs (over 200) reflect the popularity of river rafting and competitive OHV events.

Limitations: The data have not been normalized against the amount of public land in each field office. Therefore impacts are generally proportional to the number of SRPs within any single area, with the notable exception of where carrying capacities for any activity have been reached. Most recreational use does not require a permit, therefore the map may greatly under- or overstate actual usage for any one area. River areas, such as along the Colorado River where river rafting is popular, may have their impacts concentrated along the river corridor. Areas with zero permits may reflect loss of data due to a recent database rehost.

Source: BLM Recreation Management Information System (RMIS). The data are updated on at least an annual basis by individual field offices. The database is centralized and located in Phoenix, AZ, and maintained through a web-based application using the BLM's intranet. SRPs in this database represent the most reliable source of data available for recreation use on the public lands. Other records within RMIS are in need of cleanup or more frequent updating.

Comments: Impacts from recreation are positive in that it can help support local economies, increase public awareness and understanding of land management issues, and provides psychological benefits to individuals. Negative impacts may include increasing soil erosion, vegetation damage, and noise due to OHV use and other motorized forms of transport. Increased human presence can disrupt wildlife breeding habits and fragment wildlife habitat.

Special Recreation Permits



Active Special Recreation
Use Permits
by BLM Field Office
Fiscal Year 1999

15 - 50

50 - 100

Scale 1:15,000,000

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Oil and Gas Applications for Permit to Drill

Indicator: Number of Oil and Gas Applications for Permit to Drill (APDs) approved from October 1, 1996, through March 3, 2000, by BLM field office. All APDs approved on federal and Indian lands are included. The vast majority are APDs approved on BLM surface lands, followed by Indian, split estate, and National Forest System lands.

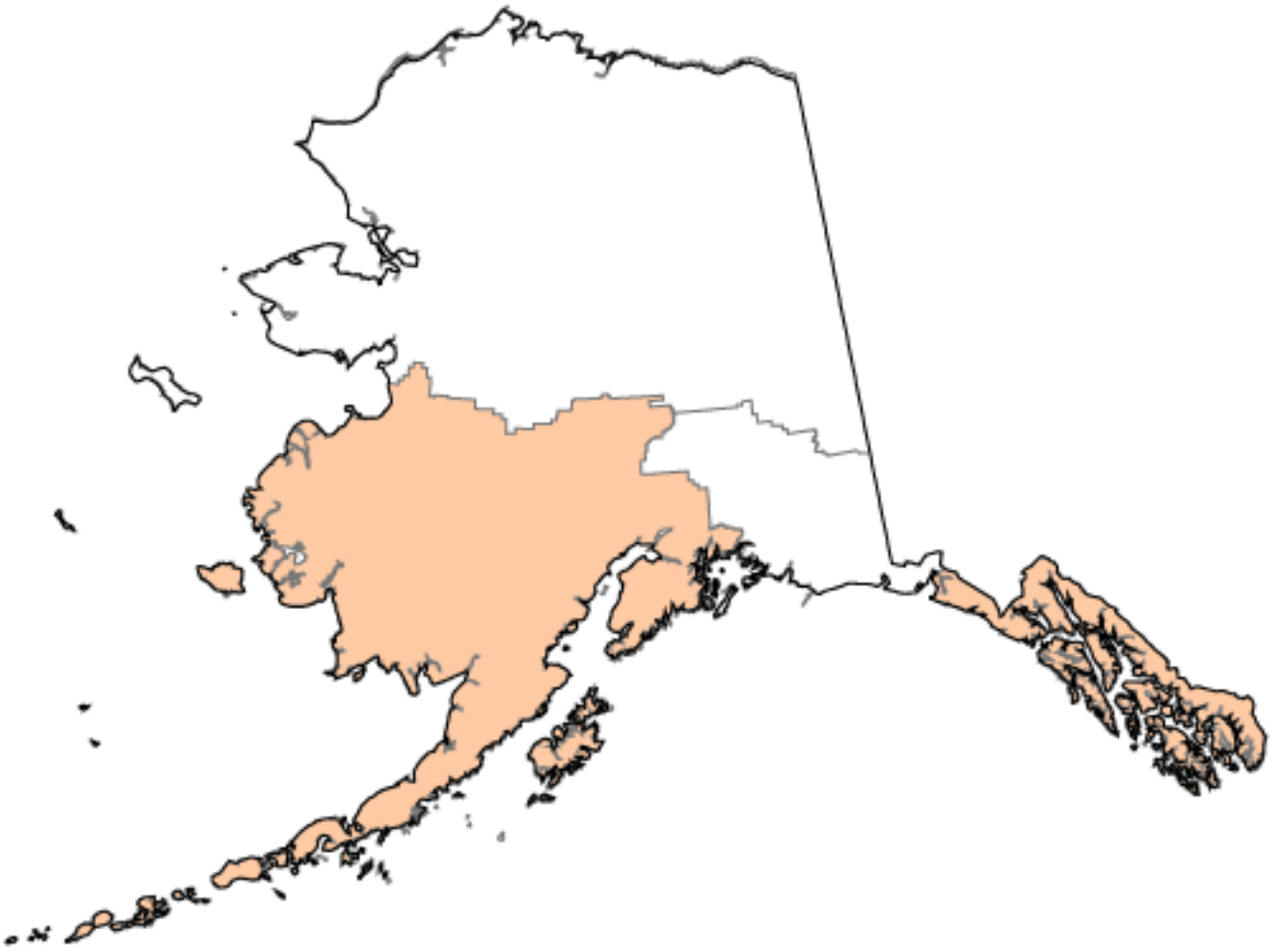
Key Findings: This indicator roughly reveals the level of impacts that are occurring on federally-managed mineral estate due to new oil and gas exploration. Surface disturbance includes well pad, road and pipeline construction. While uncommon, environmental impacts could include possible groundwater contamination by drilling fluids, oil spills, blowouts and fires. There is a less direct correlation with post-drilling impacts that may occur. Hot spots in Wyoming, Utah, and northwestern New Mexico reflect a surge in drilling coalbed methane wells. California has experienced increased activity due to royalty rate reductions for heavy oil and stripper wells. Southeast New Mexico's activity is due to conventional oil well drilling and has been consistently high for some time.

Limitations: Most but not all APDs result in actual drilling operations. Of those, a highly variable percentage are completed for production; the remainder are plugged and abandoned and the well pads and roads reclaimed. Wells drilled from APDs approved on BLM-managed mineral estate are a small percentage of oil and gas development on private and state minerals, which generally have greater environmental and economic impacts. Activity from year to year can be highly variable. The 3.5 year time period shown was used to smooth out that variation. This interval was also chosen to coincide with the period of high confidence in the reported numbers, beginning shortly after the initial implementation of the database.

Source: BLM Automated Fluid Minerals Support System (AFMSS). These data are entered by 31 BLM field offices and updated as activity warrants, often on a daily basis. Good data for APD and other operations activities are available from shortly after AFMSS implementation to the present.

Comments: Other indicators that could be used include total number of active wells, wells actually started (spudded), wells completed for production, or number of operator non-compliance incidents or accidents that result in surface impacts.

Oil and Gas



Applications for Permit to Drill Approved
on Federal and Indian Lands
by BLM Field Office between
10/1/1996 and 3/3/2000

0

1 - 35

Scale 1:15,000,000

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Economic Dependency

Indicator: Economic dependency by county. This indicator is based on income data from six economic sectors over three consecutive years. Resulting information is portrayed in ten categories corresponding to each of the six sectors (farming, mining, manufacturing, government, service, and non-labor), three combination categories, and one for non-dependency (i.e., diversified). The non-labor sector includes income such as interest, Social Security payments, and rents. BLM resource programs are reflected in farming (grazing), mining (solid and fluid minerals), and service (recreation).

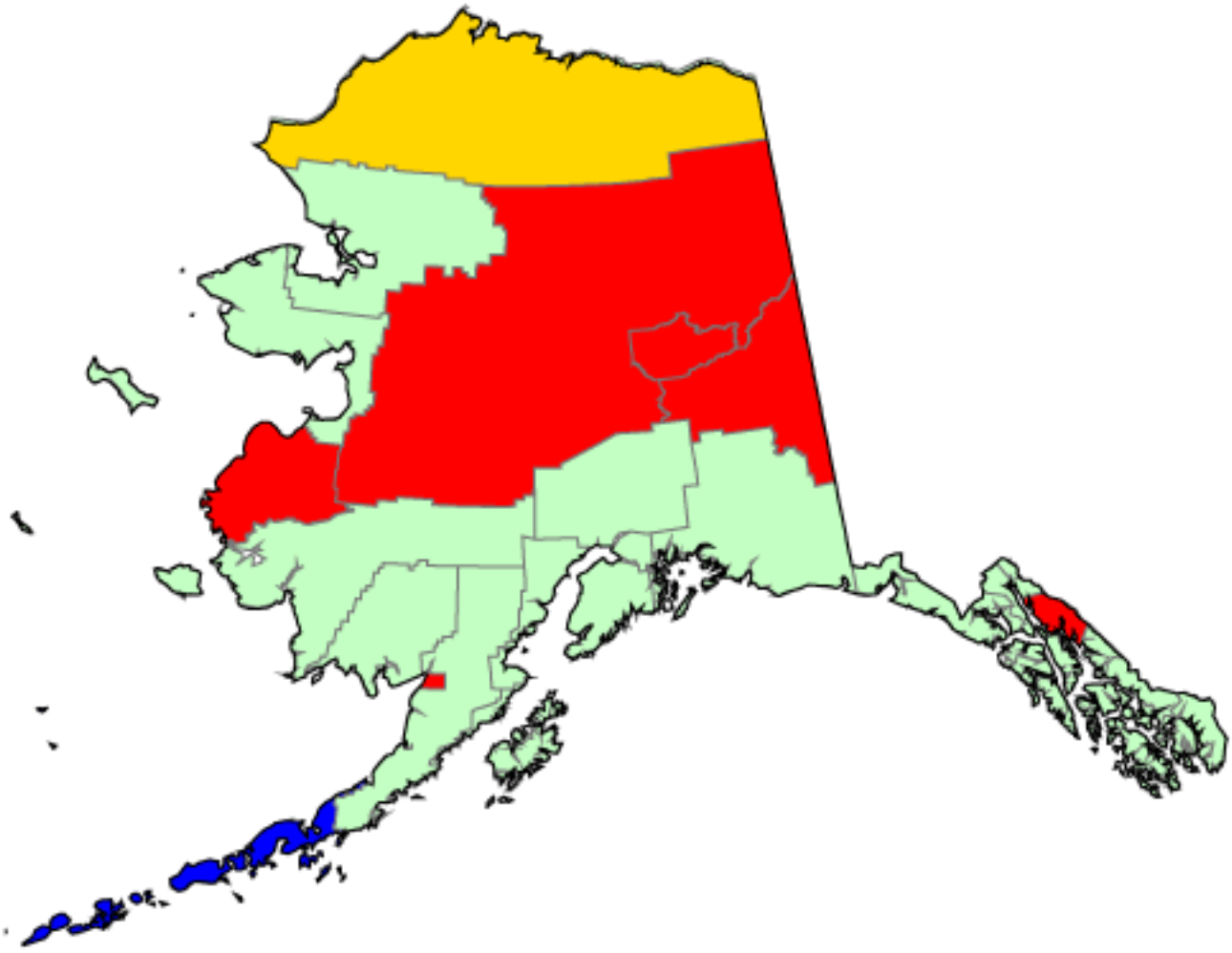
Key Findings: Most western counties are non-dependent, that is, they have diversified economies which are able to withstand single sector economic shocks. Of particular interest are those counties with large amounts of BLM land and economies that are dependent. Such counties are economically vulnerable because of their high degree of specialization. While economic indicators for these counties may appear robust, they lack the resiliency of more diversified economies to resist economic downturns. Historic examples of this include Denver's mineral dependency and consequent nearly decade-long recession in the early 1980s. Some of the potentially vulnerable areas include areas in southwestern Wyoming and west-central Nevada (mining dependent), south-central Idaho (farming and service dependent), and central Idaho and southeastern Nevada (service dependant).

Limitations: Data quality is very good. Additional statistical spatial analysis could be accomplished with additional time. Analysis, as presented in this document, could be updated yearly.

Source: Cook, Peggy J., and Mizer, Karen L., The revised ERS County Typology: An Overview, Rural Economy Division, Economic Research Service, United States Department of Agriculture (USDA), Rural Development Report 89, December 1989. Available from http://www.econ.ag.gov/epubs/other/topology. Additional analysis provided by Chuck Romaniello and Karla Rogers, BLM.

Comments: Economic Dependency was calculated by BLM economists inspired by a decade-old study done by the USDA Economic Research Service. Twelve economic sectors' income were examined: farming, mining, manufacturing, government, service, non-labor, agriculture, construction, transportation/public utilities, wholesale, retail, and fire. The last six sectors were dropped from further analysis because no counties were highly dependent upon them. To be considered dependent, a county had to meet established threshold values for a particular sector for all of the three years (1995 - 1997). The threshold value was determined by the percentage of the economic sector when compared to the whole economy. The threshold value was defined as any percentage falling at least two standard deviations above the mean for that particular sector.

Economic Dependency



County Economic Dependency
1995 - 1997

- Government
- Manufacturing
- Government & Mining
- Nonspecialized

Scale 1:15,000,000

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Leasable Mineral Revenue

Indicator: Total revenue received by county for leasable minerals from all federal lands for fiscal year 1999. Leasable minerals include primarily coal, oil and gas and geothermal. Trona and potash mining on public lands and hard rock mining on acquired lands are also included and can be significant in some areas. Revenue includes bonuses from lease sales, annual rental payments, royalties, and other revenue such as settlement payments, recoupments, gas storage fees, and estimated payments. Royalties by far make up the majority of the revenue received from leasable minerals. This map includes revenue from both public and acquired minerals.

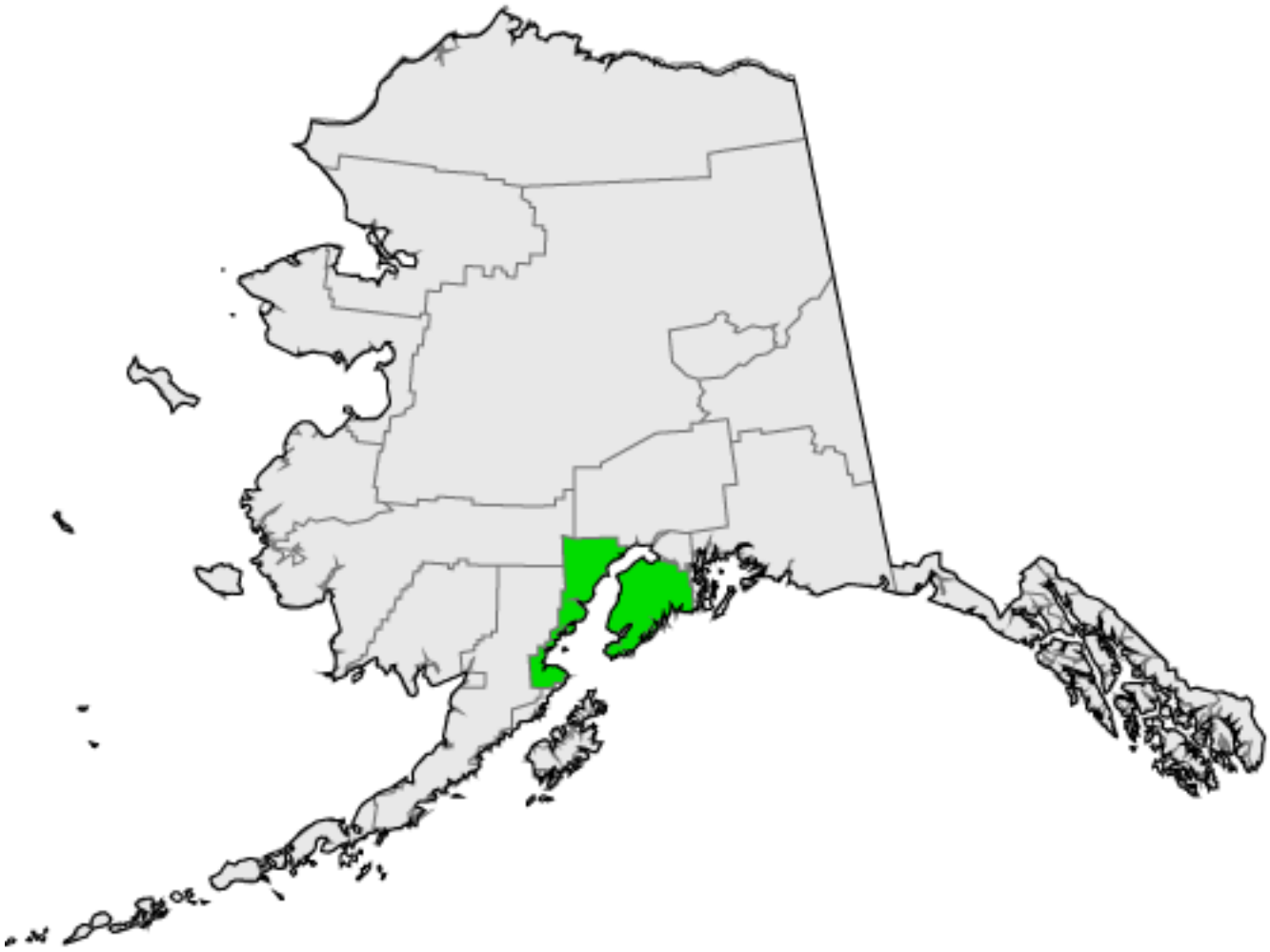
Key Findings: Leasable mineral revenues are by several magnitudes the major income producer for federal resources. The total received for the twelve western states for fiscal year 1999 equaled $980,914,987. Mineral revenues are an important indicator of economic activity in rural mining-dependent locations. Wages and income directly generated by mining related activity as well as indirect economic activity (economic activity dependent upon direct mining-related income) can be crucial in the economic health and historically the very existence of small rural communities. High levels of leasable mineral revenues are generated in counties across the entire spectrum of population density and per capita income. High revenues and economic dependency occur in a number of counties in northeast and southwest Wyoming, northwest and southeast New Mexico. Mineral dependent counties in both northwest and central Nevada, central Utah, south central Washington and southeast Montana are also areas of BLM concern.
Generally, half of the revenue received from leasable minerals on federal onshore public lands is disbursed to the State where it originated, and, for acquired minerals, generally one-quarter is disbursed to States. This creates a high level of interest from State governments in maintaining the development potential of the federal minerals, particularly in States with high percentages of productive federal mineral ownership like Wyoming, Utah and New Mexico.

Limitations: The BLM also collects additional revenue from filing fees, non-compliance assessments, and administrative charges, but these are negligible compared to the total, not easily separable into county of origin and are not included. Onshore revenue of $13,583,452 could not be separated into county of origin so is not on the map. Revenue from Native American minerals is not a federal resource so is not included. The data is not differentiated by surface ownership (e.g., BLM, private surface, National Forest System lands.) The analysis would be made more useful if leasable mineral revenue could be normalized by a digitized and accurate data layer of the BLM-managed mineral estate, which does not currently exist. An estimate of this kind would provide an indicator of mineral revenue per BLM sub-surface acre, a potentially useful socioeconomic indicator of economic activity.

Source: Minerals Management Service (MMS): http://www.rmp.mms.gov/Stats/fmrd.htm. While the BLM collects a portion of this total, MMS data accurately reflects the BLM collections for bonuses and first year rentals. Data is good and is updated annually.

Comments: None

Leasable Mineral Revenue



Leasable Mineral Revenue
Fiscal Year 1999

$2175
No Data

Scale 1:15,000,000

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Per Capita Income

Indicator: 1997 estimated per capita income by census tract. Per capita income is calculated by normalizing an area's income by its population. The resulting values may be used as a coarse comparison of the economic well-being of people living in different areas. Census tracts are small, relatively permanent geographic entities within counties. Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow visible features. This information is portrayed using colors to indicate standard deviations from the mean.

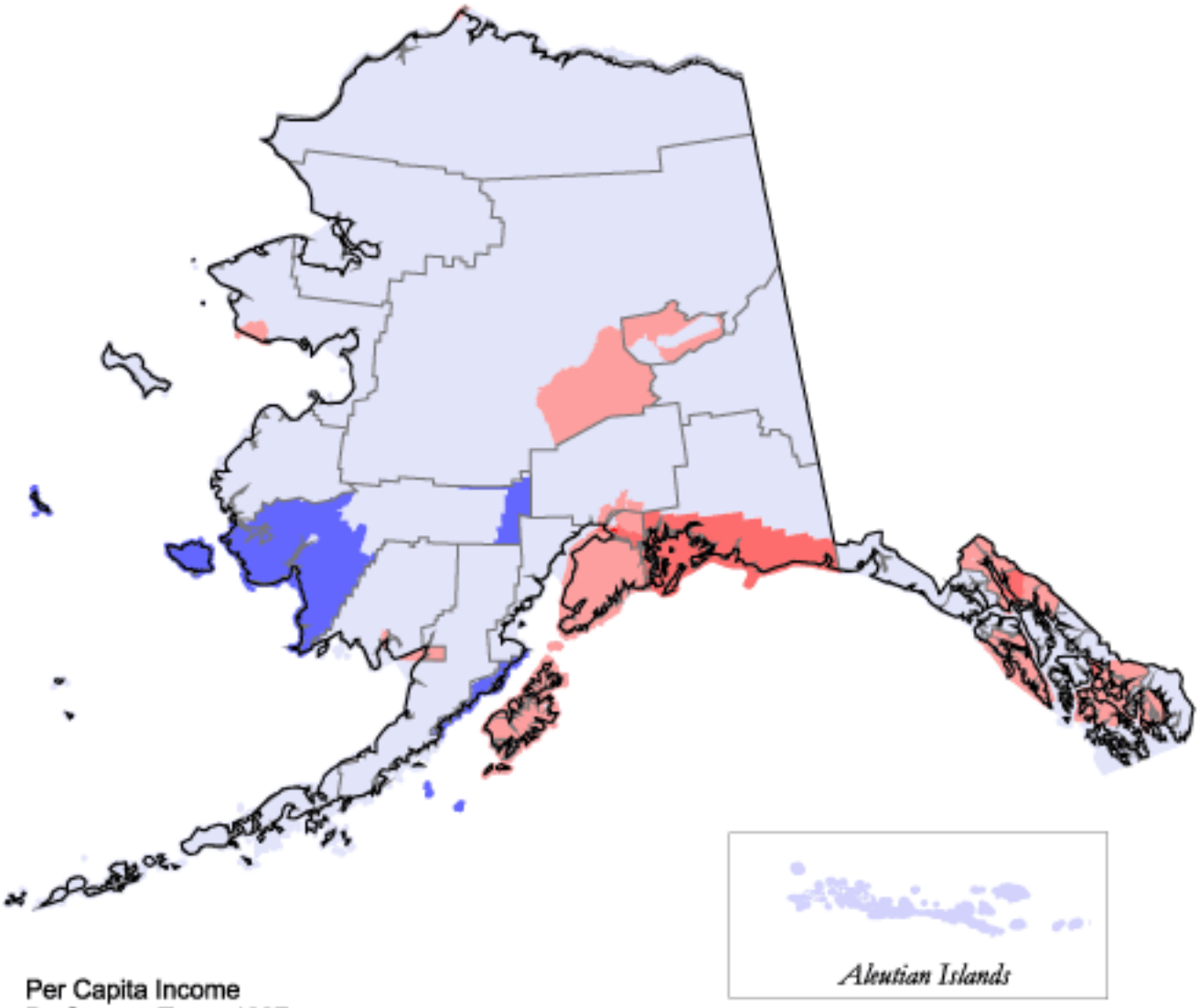
Key Findings: Per capita income compared with land status maps indicate where severe poverty or significant wealth and BLM lands coincide. BLM lands generally are not located in areas with either very high or very low per capita income. This generalization is not true in northwestern Arizona where high concentrations of BLM land and very low income do coincide. Under circumstances such as these, management of the land may require a heightened sensitivity to economic needs of the people and environmental justice. Conversely areas of high per capita income may require a considerably different focus and a different set of communication tools.

Limitations: These data are considered to be of very good quality and are easily obtainable. This information provides a general picture of an area's overall wealth. It is not sufficient information to fully depict an area's economic character or vitality.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census, available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu, City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html or in the library reference section.

Comments: This statistic is based on the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Per Capita Income, 1997



Per Capita Income
By Census Tract, 1997

- $0 to 6,500
- $6,500 to 17,200
- $17,200 (Mean)
- $17,200 to 28,000
- $28,000 to $38,880
- $38,800 to $49,500
- $49,500 to $132,700

Scale 1:15,000,000

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Population Density

Indicator: Population density (number of people per square mile) in 1997, mapped by census tract. Population density is calculated by normalizing an area's population by its geographic extent (in square miles). Census tracts are small, relatively permanent geographic entities within counties. Generally, they have between 2,500 and 8,000 residents and boundaries that follow visible features.

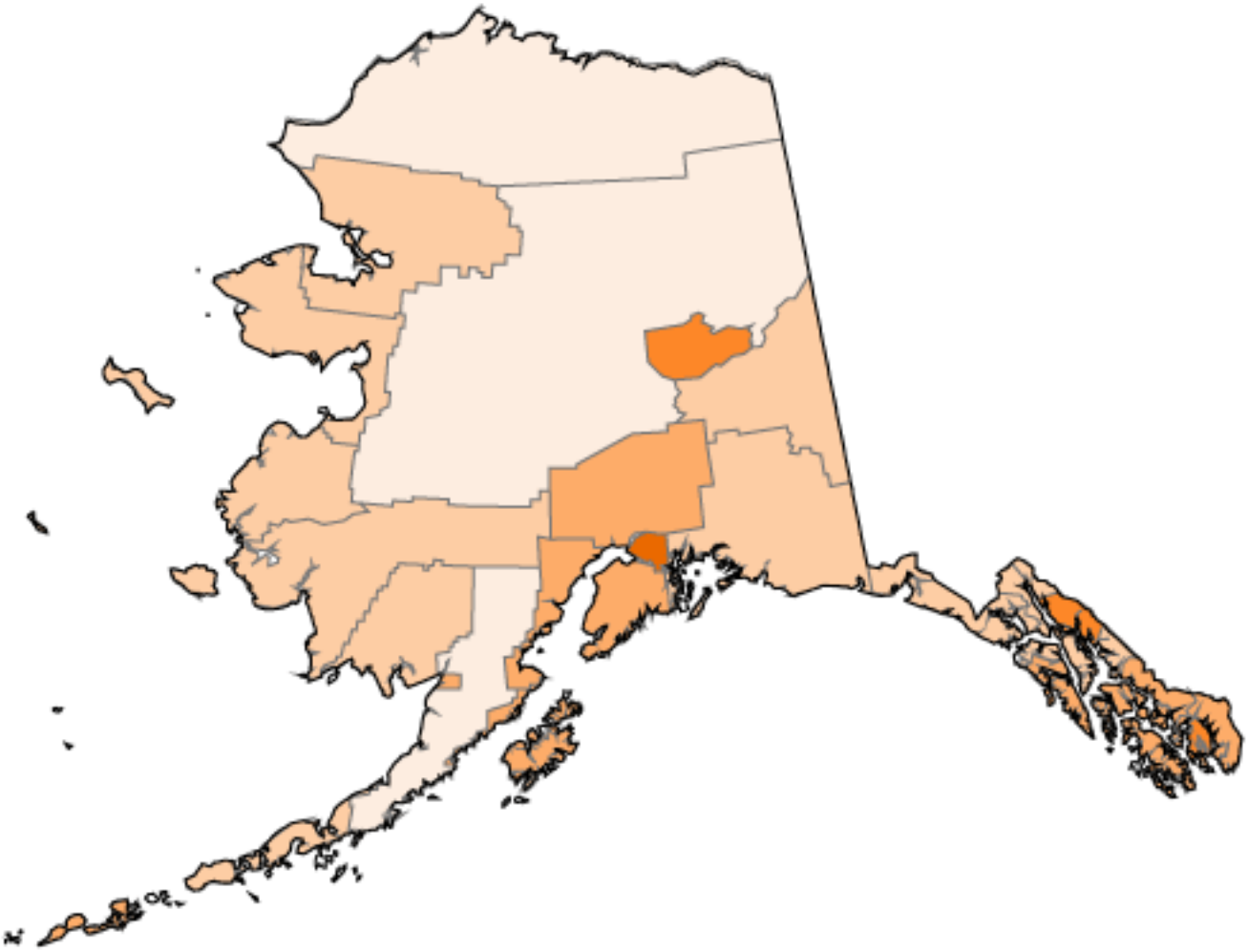
Key Findings: BLM lands are almost exclusively located in areas of low population density. Such conditions can provide opportunities for wildlife, recreation, and consumptive use not generally possible in more populated areas. There are exceptions, however, that offer opportunities of their own. For example, in northeastern Utah, watershed units with 60-80 percent BLM land lie adjacent to areas of high population density. Under such circumstances, BLM lands may be especially important for recreation, as a haven for special status species, or simply for the esthetic value. As such, higher population concentrations may reflect a higher potential for conflicts among uses.

Limitations: These data are considered to be of very good quality and are easily obtainable on an annual basis. In isolation, this information provides a general picture of the intensity of human settlement. Many analyses are possible with this information.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census: available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu. City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html or in the library reference section.

Comments: This information comes from the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Population Density



People Per Square Mile
By Census Tract, 1997

- 0 - 0.1
- 0.1 - 1
- 1 - 10
- 10 - 100
- 100 - 1,000

Scale 1:15,000,000

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Population Density Change

Indicator: Change in population density per square mile from 1989 to 1997, by census tract. Population density change is calculated by subtracting an area's population in 1997 from that in 1989 and normalizing by geographic extent (square miles). Census tracts are small, relatively permanent geographic entities within counties. Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow visible features.

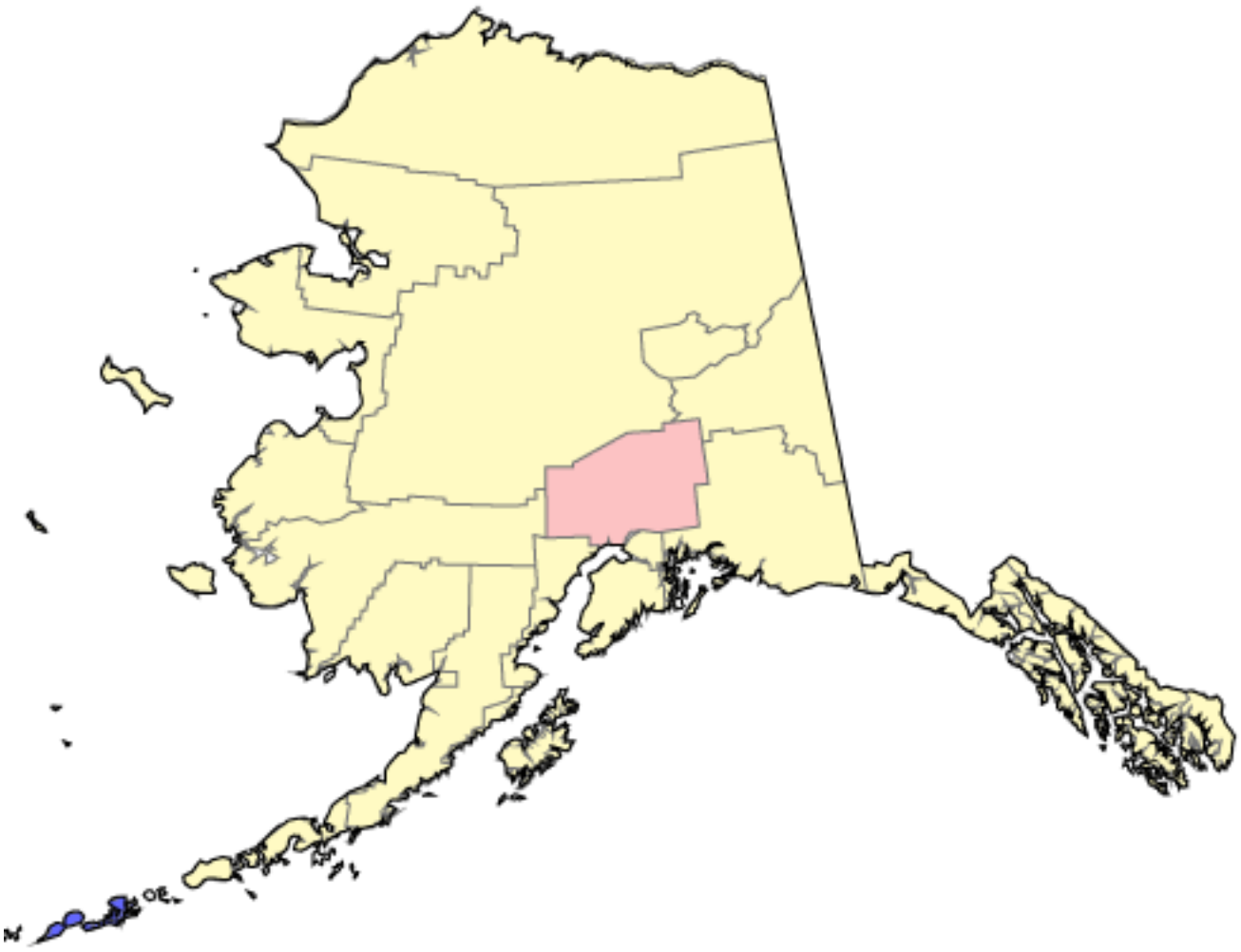
Key Findings: This information provides a general picture of the changing intensity of human settlement. In general, BLM lands are seldom concentrated in the areas of fastest growth. Population density change compared with per capita income provides an indicator of the economic health of an area. Generally, areas with low per capita income and decreasing population density are considered economically unhealthy and would benefit from financial stimulus. One area of possible concern is located on the western border of Nevada where high concentrations of BLM lands do exist in the vicinity of lands with relatively high population growth as well as lands showing population loss. Another lies on the southeastern border of California where negative population growth exists. Only one area, southwestern Nevada, appears to show a high concentration of BLM lands in conjunction with negative population growth and very low per capita income. Areas of relatively high population growth may offer exceptional economic or aesthetic opportunities. Areas of negative growth, which include many rural areas throughout the west, may require special sensitivity to the needs of the people in the local communities.

Limitations: These data are considered to be of very good quality and are easily obtainable. Many additional analyses are possible with this information.

Source: Census CD+Maps by Geolytics, available from: http://www.geolytics.com. Decennial Census, available in National Atlas of the United States at: http://www.nationalatlas.gov/atlasftp.html and in hard copy at local libraries; also found at the Government Sharing Project: http://govinfo.kerr.orst.edu. City and County Data Book, available for order at: http://www.census.gov/statab/www/ccdb.html, or in the library reference section.

Comments: This information comes from the decennial census. During the later part of a decade, current estimates may be found at the sources above.

Population Density Change



Population Density Change
Percent By Census Tract
1989 - 1997

- -1.5% to -0.2 (2 Std. Dev.)
- -0.2% to 0.2 (1 Std. Dev.)
- 0.2% (Mean)
- 0.2% to 0.5 (1 Std. Dev.)
- 0.5% to 2 (2 Std. Dev.)

Scale 1:15,000,000

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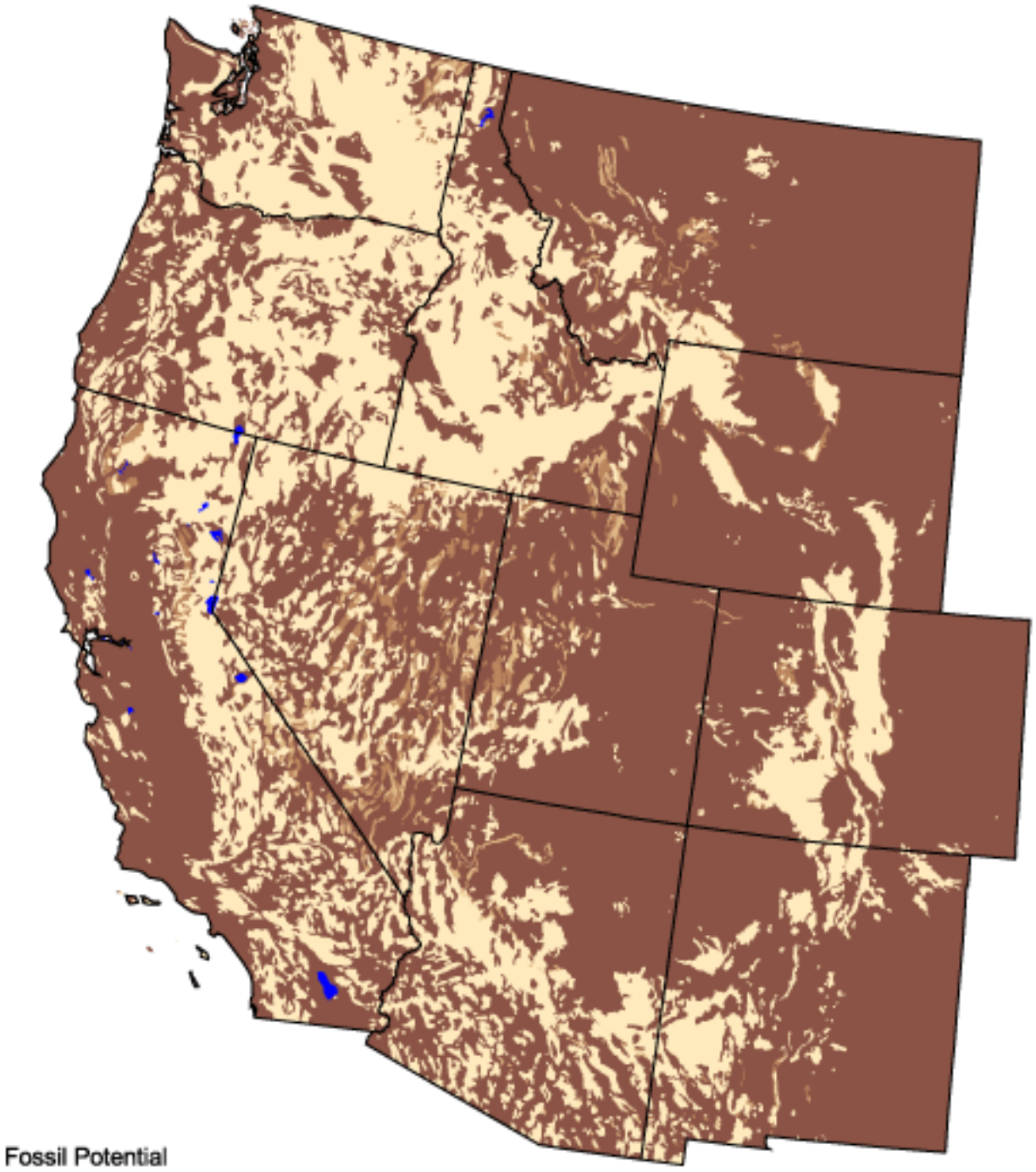
Fossil Resource Potential



Fossil Potential

- Low Fossil Potential
- Invertebrate Fossil Potential
- Low Vertebrate Fossil Potential
- High Vertebrate Fossil Potential
- Water

Scale 1:12,000,000

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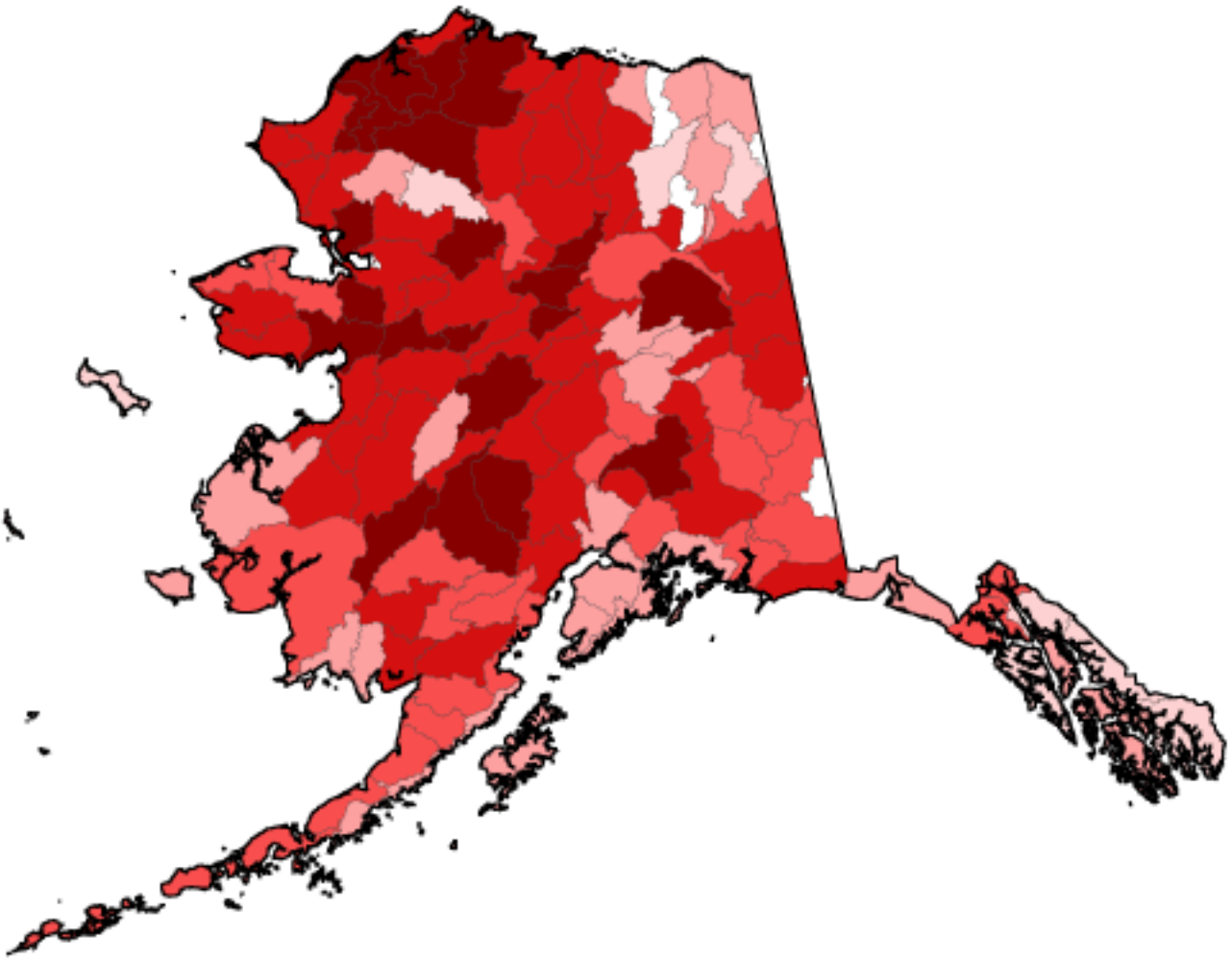
BLM Subsurface Parcel Size



Mean BLM Subsurface Parcel Size

- < 1 Section
- > 1 Section and < 10 Sections
- > 10 Sections and < 1 Township
- > 1 Township and < 5 Townships
- > 5 Townships

1:15,000,000

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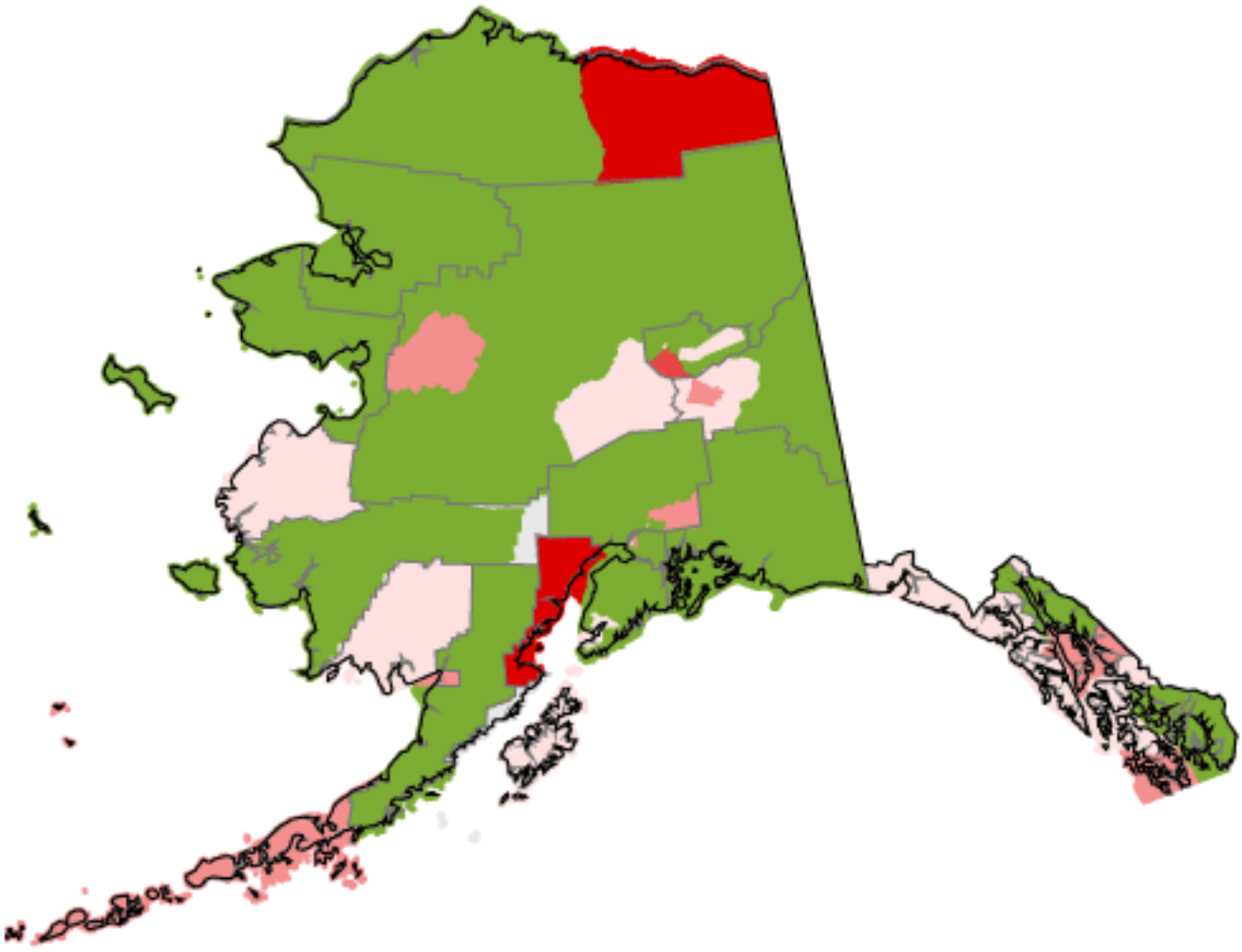
Change in Per Capita Income



1990 to 1997 Change in Per Capita Income

- %-100 to -27 (< -3 Std. Dev.)
- %-27 to -13 (-3 Std. Dev.)
- %-13 to 1 (-2 Std. Dev.)
- %1 to 15 (-1 Std. Dev.)
- %15 (Mean)
- %15 to 29 (1 Std. Dev.)
- %29 to 43 (2 Std. Dev.)
- No Data

Scale: 1:15,000,000

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